



# State of Michigan

Bureau of Community Action  
and Economic Opportunity

Technical Division

Technical Weatherization  
Policies

Weatherization  
Assistance  
Program

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## MICHIGAN WEATHERIZATION PROGRAM

### ACRONYMS/ABBREVIATIONS

ACH	- Air Changes per Hour
ASHRAE	- American Society of Heating, Refrigerating and Air Conditioning Engineers
eBCJO	- Electronic Building Check and Job Order
BCJO	- Building Check and Job Order
BCAEO	- Bureau of Community Action and Economic Opportunity
BTL	- Building Tightness Limit
BTLa	- Building Tightness Limit (sub) a
BTU	- British Thermal Unit
CAA	- Community Action Agency
CAZ	- Combustion Appliance Zone
CEU	- Continuing Education Unit
CFM	- Cubic Feet per Minute
CO	- Carbon Monoxide
CO <sub>2</sub>	- Carbon Dioxide
CSPM	- Community Services Policy Manual
DHS	- Department of Human Services
DHW	- Domestic Hot Water (tank)
DOE	- Department of Energy (Federal)
DTL	- Depressurization Tightness Limit
F	- Fahrenheit
FADD	- Field Audit Data Document (replacement for eBCJO)
H&S	- Health and Safety



IAQ	- Indoor Air Quality
IID	- Intermittent Ignition Device
k	- One Thousand (1000)
kBTU	- Thousand BTU (1 kBTU)
K&T	- Knob and Tube (wiring)
LAB	- Labor
LBL	- Lawrence Berkley Laboratory
LPA	- Limited Purpose Agency
LWO	- Local Weatherization Operator
MAT	- Material
MAX	- Maximum
MCAAA	- Michigan Community Action Agency Association
MFAD	- Manufactured Field Audit Document (replacement for eBCJO)
MHEA	- Manufactured Home Energy Audit
MIN	- Minimum
MPSC	- Michigan Public Service Commission
N	- No
NA	- Not Applicable
NEAT	- National Energy Audit Tool
O <sub>2</sub>	- Oxygen
OTL	- Overall Tightness Limit
Pa	- Pascal
PPM	- Parts Per Million
PSI	- Pounds per Square Inch

R	- Thermal Resistance
Req'd	- Required
SIR	- Savings to Investment Ratio
TWP	- Technical Weatherization Policies
WAP	- Weatherization Assistance Program
WAPTAC	- Weatherization Assistance Program Technical Assistance Center
WA8	- Weatherization Assistant 8
WPPM	- Weatherization Processes and Procedures Manual
Wx	- Weatherization
Y	- Yes

## INTRODUCTION AND OVERVIEW

The Technical Weatherization Policies (TWP) contains policies and requirements for the Michigan Weatherization Program. Community action agencies/local weatherization operators/limited purpose agencies (CAAs/LWOs/LPA's) receiving funding from the State of Michigan for local administration of the weatherization program shall follow the guidelines contained in the TWP relative to technical and program requirements.

### **2000 TECHNICAL REQUIREMENTS**

This chapter contains the technical weatherization policies and requirements for the Michigan Weatherization Program, including measures guidelines/policies (which include "incidental repairs"), inspection/testing and energy audit requirements, standards and specifications for weatherization measures, manufactured home weatherization requirements, health and safety requirements, and testing requirements (which include blower door testing, carbon monoxide testing, combustion appliance inspection/testing, and infrared scans).

### **2100 WEATHERIZATION MEASURES**

Guidelines, policies, costs, standards and specifications for weatherization measures and related repairs are contained in this section, along with inspection, testing and energy audit requirements.

#### **2101 GENERAL WEATHERIZATION MEASURES GUIDELINES/POLICIES/COSTS:**

All weatherization materials utilized in conjunction with work performed as a part of this program shall, at minimum, meet the Standards for Weatherization Materials contained in "Appendix A" as published in the current U.S. Department of Energy Weatherization Assistance Program (DOE/WAP) rules (See Section 4400, Minimum Standards for Wx Materials). In cases where additional requirements apply, the specific requirement(s) will be listed in the appropriate section of this document.

All work measures shall be completed so as to successfully perform the intended function on a continuing basis (a quality of product and installation to provide a minimum 10-year life under normal conditions). Work shall be completed in a manner so as not to detract from the general appearance and structural integrity of the home and shall be in compliance with governing codes, the requirements of this document, and manufacturer's recommendations.

Weatherization measures are for the purpose of rendering the heated portions of dwellings energy efficient and to ensure the safety and protection of such measures, whether new or existing (e.g., any wood or other product which the manufacturer recommends be sealed, that is used to complete weatherization and which is exposed to moisture, shall receive a minimum of prime painting or other recommended sealer). For the purpose of this program, if necessary client usage of areas requires heat to those areas, they shall be treated as heated and weatherized accordingly. Unheated utility rooms, porches, etc., are not eligible for weatherization.

Health and safety measures shall/may be addressed as required to eliminate hazards as defined in Section 3800 and in accordance with the State of Michigan, Department of Energy Weatherization Assistance Plan.

"Incidental Repairs" means those repairs necessary for the effective performance or preservation of weatherization materials. Incidental repairs may be addressed as required (see CSPM 607).

#### **2102 SUPPORT, LABOR AND MATERIAL AVERAGE:**

LWOs shall comply with the DOE established average per unit cost for support, labor, and materials for the program year. Individual unit costs may exceed the average, but overall spending for the program year must fall within the average limit (see CSPM 613).

2103 Weatherization Established Procedure (Flow Chart) (2/2007)

Work shall be completed in a manner so as not to detract from the general appearance and structural integrity of the home and shall be in compliance with governing codes.

			Inspector Agency	State Certified Inspector Contract	***State Licensed Residential Builder or Maintenance and Alteration Contractor	State Licensed Mechanical Contractor	State Licensed Electrical Contractor	Agency Labor Crew
		*Specific training may be required before operating equipment **May not inspect and install equipment on same job ***Within licensed discipline						
On site activity for all dwellings	Pre-Inspection	Blower Door Testing*	*	*	*	*	*	*
		Combustion Appliance Inspection/Testing	*	*				
		Health and Safety Inspection/Testing				**		
		Energy Audit Requirements						
The previous categories SHALL be completed before the job may proceed or be assigned.								
Weatherization Measures	Standards and Specifications	Furnace/Boiler/Space Heater Replacement				**		
		Furnace Flame Retention Burner				**		
		Furnace/Boiler/Space Heater Replacement & Furnace Flame Retention Burner & "Optional" Furnace/Boiler/Space Heater Tune-Up Repair <b>MUST</b> be completed before any other measures						
		Attic Insulation						
		Attic Ventilation						
		Band Joist Insulation						
		Duct/Pipe Insulation & Duct Seal/Repair/Replacement						
		Floor Insulation						
		Foundation/Perimeter Insulation						
		Foundation Ventilation						
		Infiltration/Exfiltration Measures						
		Smoke Detectors						
		Storm Windows						
		Venting Clothes Dryers						
		Wall Insulation						
	Electric Baseload Measures	Compact Florescent Light Bulbs						
		Refrigerator Replacement (existing <b>MUST</b> be properly disposed/recycled)						
	Optional Weatherization Measures	Water Heaters (may be considered as Health and Safety when inoperable or leaking beyond repair)				**	**	**
		Low Flow Shower Head						
		Water Heater Insulation						
		Clock Set Back Thermostat	**	**		**		
		Furnace/Boiler/Space Heater Tune-Up Repair				**		
	Health and Safety	Mobile Home Weatherization						
		Health and Safety Guidelines						
		Asbestos						
		Carbon Monoxide				* & **		
		Indoor Air Quality				* & **		
		Lead						
		Unsafe Conditions						
		Wiring					**	
		Health and Safety Measures						
On site activity for all dwellings	Post Inspection Requirements **	Blower Door Testing*	*	*	*	* & **	*	
		Combustion Appliance Inspection/Testing	*	*		* & **		
		Health and Safety Inspection/Testing						
		Energy Audit Requirements						
		Building Check and Job Order Sheet						
		Client Inspection/Assessment						
		The previous categories SHALL be completed before the job is Counted/Reported complete						

## 2200 INSPECTION/TESTING/ENERGY AUDIT REQUIREMENTS

### 2201 INSPECTION/TESTING REQUIREMENTS:

A complete pre-inspection and post-inspection is required for each home weatherized. Inspections shall include energy audit reviews as well as the required testing listed below. Post-inspection approval is mandatory for a home to be considered a completion. All inspections must be completed by a DHS certified Wx Inspector or conditionally certified inspector with limited approval by a DHS Technical Staff (see Section 4500).

### 2202 BLOWER DOOR TESTING:

All homes weatherized require a pre-inspection and post-inspection blower door test (see Section 4000 and Section 4200).

### 2203 COMBUSTION APPLIANCE INSPECTION/TESTING:

All homes weatherized require pre-inspection and post-inspection combustion appliance inspection and testing (see Section 4000).

### 2204 HEALTH AND SAFETY INSPECTION/TESTING:

All homes weatherized require pre-inspection and post-inspection health and safety inspection and testing (see Section 3200 and 3900).

### 2205 ENERGY AUDIT REQUIREMENTS:

The "Michigan Weatherization Program Audit Requirements" chart on page 15 shows the audit requirements based on dwelling characteristics.

### 2206 NEAT WEATHERIZATION MEASURES PRIORITIES (FOR STANDARD WOOD FRAME HOMES):

For one to four unit homes of standard wood frame construction the following list of priorities may be used or a National Energy Audit Tool (NEAT) audit may be completed.

- Health and Safety Measures
- Major Bypasses
- Duct Sealing/Repair/Replacement
- Duct Insulation (in unconditioned areas)
- Attic Insulation (if under an effective R8, add additional R-19)
- Knee wall Insulation (R-11)
- Wall Insulation (R-11 or R-value determined by wall thickness)
- Infiltration/Exfiltration
- Compact Fluorescent Light Bulbs
- Band joist ("Sill box") Insulation (R-11/19 as applicable)
- Floor Insulation (R-11)
- Perimeter Insulation (R-10)
- Refrigerator Replacement (SIR justified or as a Health & Safety Measure) (owner occupied only)
- Domestic Hot Water Tank (DHW) (Replacement (SIR justified or as a Health & Safety Measure) (owner occupied only)

Attic Insulation (shall be brought up to R-30 if funding permits, regardless of amount of existing insulation – R-38 if homes are heated by fuels other than natural gas, and degree days exceeding 6300.

The measures above shall be completed in the order listed and according to the procedures outlined in Section 2500.

Note: In cases where, due to conditions/circumstances at a job site, a priority measure cannot be addressed (e.g., a bad roof precludes attic insulation), documentation of the conditions/circumstances shall be provided on the appropriate page of the eBCJO and the measure shall not be addressed.

## 2207 NATIONAL ENERGY AUDIT TOOL (NEAT) DETERMINED WEATHERIZATION MEASURES:

NEAT audits are required for the determination of weatherization measures to be installed for one to four unit homes in cases where:

- No major insulation measures (insulation void area greater than 30% of component area - e.g., attic, knee wall, wall, floor, or perimeter) are required/possible.
- Furnace/boiler/space heater with steady state efficiency (SSE) of less than "70%" or more than 5% below the manufacturer's rated efficiency.
- Inoperable or unsafe furnace/boiler/space heater.
- Homes are of non-standard construction.
- Agencies may elect to utilize a NEAT audit for any one to four unit homes with the exception of manufactured homes.

Weatherization measures with a computed Savings to Investment Ratio (SIR) of 1.5 or greater as established by a NEAT audit shall be addressed in descending order (from the highest SIR down to a minimum SIR of 1.5).

NEAT may indicate that a measure shall be addressed, but conditions/circumstances dictate otherwise

- These measures shall be turned off in the NEAT setup "Candidate Measure" screen and indicate the condition on the "General Info." screen at the beginning of the audit.
- or by inserting a "zero" or in some cases, "none" in others, the respective measure screen
- Finally add a comment in the indicated "comment" section, and document the conditions or circumstances on the appropriate page of the eBCJO, and the measure shall not be addressed.

## 2208 MANUFACTURED HOME PRORITY MEASURES:

Manufactured home measures allowed are determined from a list of priorities approved by DOE:

- Health and safety Measures (Includes, but not limited to, smoke detector installation, clothes dryer venting and an inoperative heating system replacement)
- Air Sealing (including duct sealing)
- Ceiling-roof insulation (if existing R-value is less than R-11).
- Mandatory Standard Manufactured Home Door replacement for non-repairable units\*\*\*
- Wall Insulation (If space exists and existing R-value is less than R-9) Air Sealing – infiltration/exfiltration.
- Belly-Floor Insulation (If existing R-Value is less than R-19)
- Storm Windows (Inside or Outside)
- Heating System tune-up (Replacement if SSE is less than 70%) \*\*
- Setback (clock)Thermostat \*\*
- Compact Fluorescent light-bulb replacement
- Refrigerator Replacement when SIR for measure is 1.5 or greater \*
- Domestic Hot Water Tank Insulation ( includes insulating supply line)\*\*

Note: Measures 9, 10, and 11 are included as base load reduction measures.

\*This measure needs to be justified using either a MHEA, eBCJO, or a DOE approved audit to determine the SIR of the measure with the existing and replacement equipment.

\*\*These are Optional Weatherization Measures

\*\*\*A Major Bypass Measure

The measures above shall be completed in the order listed and according to the procedures outlined in Section 2500.

## 2209 MANUFACTURED HOME ENERGY AUDIT (MHEA):

MHEA audits are required for the determination of weatherization measures to be installed for manufactured homes in cases where:

- A major insulation measure (insulation void area greater than 30% of component area - e.g., ceiling cavity, side wall, or floor/belly) is required/possible.
- Furnace/boiler/space heater with steady state efficiency (SSE) of less than "70%" or more than 5% below the manufacturer's rated efficiency.
- Inoperable or unsafe furnace/boiler/space heater.
- Manufactured homes of non-standard construction with (stick built) additions.
- Agencies may use a MHEA for any manufactured home in place of Manufactured Home Priority Measures.

Weatherization measures with a computed Savings to Investment Ratio (SIR) of 1.5 or greater as established by a MHEA audit shall be addressed in descending order (from the highest SIR down to a minimum SIR of 1.5).

MHEA may indicate that a measure shall be addressed, but conditions/circumstances dictate otherwise

- These measures shall be turned off in the MHEA setup "Candidate Measure" screen and indicate the condition on the "General Info." screen at the beginning of the audit.
- or by inserting a "zero" or in some cases, "none" in others, the respective measure screen
- Finally add a comment in the indicated "comment" section, and document the conditions or circumstances on the appropriate page of the eBCJO, and the measure shall not be addressed.

## 2210 MULTIFAMILY AUDITS (5 Units or More)/WEATHERIZATION MEASURES:

Written approval is required prior to the commencement of weatherization services.

A multifamily building with five or more units must have its own audit performed (e.g., Residential Conservation Services [RCS] audit for multifamily buildings) to identify cost effective measures to be installed. The audit completed by a utility company or other entity using the DOE-approved audit format must be submitted to the State Of Michigan Technical Weatherization Division and approved in writing before any weatherization measures can be installed. (See CSPM 608)

The NEAT audit or use of the "NEAT Weatherization Measures Priorities" may be appropriate for five unit or more multifamily buildings. In such cases:

- The LWO shall contact the State of Michigan Weatherization office,
- Provide appropriate documentation (e.g., building description, pictures, and a completed electronic Building Check and Job Order Sheet) to justify use of the NEAT audit
- And must receive written approval prior to the commencement of weatherization services.

## 2211 MANDATORY WEATHERIZATION MEASURES:

The following measures are required for one to four unit homes:

Major Bypasses - Address in accordance with "Methods of Addressing Infiltration/Exfiltration" in Section 3100. Major bypasses, as determined by blower door testing, are generally defined as openings/direct penetrations to the interior, between heated and unheated areas, of ½ inch or greater, if in the pressure planes (foundation areas/ceiling and within three feet of the ceiling) and other specific large openings into heated areas (from unheated areas) which may be subject to leakage (e.g., broken glass, missing or broken windows and doors, open dryer vents). Examples of ½ inch gaps in the pressure planes that generally shall be addressed:

- Access Openings
- Mechanical Penetrations
- Fireplace Damper
- Balloon Frame Construction
- Knee wall Floors

Duct Sealing, Repair and/or Replacement - Address in accordance with Section 2700.

Blower Compartment Sealing - Address in accordance with Section 2700.

Duct and Pipe Insulation (if located in unheated areas) - Address in accordance with Section 2700.

## 2212 EXCLUSION OF MEASURES/NO WEATHERIZATION WORK POSSIBLE:

If any of the audit required measures are already in place or are not possible to perform, file documentation (on the electronic Building Check and Job Order Sheet) will be required to clarify such situations (a brief explanation shall be noted in the appropriate section under "Comments" on the NEAT audit if used).

Health and safety factors which cannot be corrected e.g., Removal of mold, odors, viruses, bacteria, unsanitary (including raw sewage) conditions, and rotting wood. If necessary, weatherization services may need to be delayed until the problem can be corrected or referred to another agency that can take remedial action. The Health and Safety condition shall be properly documented.

Some factors which would limit the effectiveness of any measure, properly documented could justify omission of that measure. Client circumstances (e.g., health) shall also be considered. The client may refuse installation of one audit required measure. Weatherization work is prohibited if the client refuses two or more audit required measures (refrigerators, compact fluorescent light bulbs, clock setback thermostats, water heater treatment and low flow shower heads are not included and may be refused by the client without penalty).

If energy savings cannot be realized under this program due to the condition of a home, these conditions shall be documented and the home WILL not be weatherized. Such conditions shall be brought to the attention of the client with referrals to other help sources if available.

## 2213 ADDITIONAL MEASURES/REPAIRS (MANDATORY & OPTIONAL):

The following weatherization measures, in addition to audit required measures, shall/may be addressed during the home weatherization work.



## 2214 MANDATORY HEALTH AND SAFETY MEASURES:

- Clothes Dryer Venting – Un-vented clothes dryers shall be vented outside (see Section 3200).
- Smoke Detectors - Smoke detectors shall be provided (see Section 3200).

## 2215 OPTIONAL HEALTH AND SAFETY MEASURES:

Optional health and safety measures may be addressed in accordance with the Health and Safety Guidelines (see Section 3700).

## 2216 OPTIONAL WEATHERIZATION MEASURES:

It will be the LWOs option to complete the following measures as weatherization measures on one to four unit homes, if it is felt there would be a benefit to the client and if installation of these items would not preclude installation of audit required weatherization measures:

- Low Flow Shower Head - Low flow showerheads may be installed in accordance with Section 3701.
- Water Heater Insulation - Water heaters may be insulated in accordance with Section 3702.
- Clock Set Back Thermostat - Set back thermostats may be installed in accordance with Section 3703.
- Heating System Tune-ups/Repairs - Heating system tune-ups/repairs shall be addressed in accordance with Section 3705.

LWOs shall establish a local policy as to whether the installation of water heater insulation, low flow shower heads, and clock set back thermostats will be addressed.

## 2217 INCIDENTAL REPAIRS:

“Incidental Repairs” means those repairs necessary for the effective performance or preservation of weatherization materials (see CSPM 607). These repairs must be referenced in the eBCJO to the documented new or existing energy measure.

<h2><u>2300 NATIONAL ENERGY AUDIT TOOL (NEAT)</u></h2>
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## 2301 NATIONAL ENERGY AUDIT TOOL (NEAT) SETUP:

This Subject contains requirements relative to the Setup of the NEAT Version 7.4.3 for use to complete audits as specified in Section 2400. It also includes instruction relative to the Setup of the NEAT for use in sizing furnaces.

## 2302 NAMING AGENCY'S MASTER NEAT SETUP/PARAMETER FILE:

Agency's Setup/Parameter file including the following job costs, fuel costs/rates, candidate measures, weather data, and key parameters shall be saved and renamed using agency acronym with the program year.

Example: The NEAT setup file named WAB1.mdb (found in C:\Program Files\Weatherization Assistant\ on the hard drive) for the Local Weatherization Operator in PY 07/08 would be LWO708.mdb for their master setup/parameter file.

### 2303 MATERIAL AND LABOR COSTS:

LWOs shall enter their material/labor costs for the allowable NEAT measures. The extent of the work for each measure which these costs shall represent is specified in Section 2400.

Note: Material and Labor costs can be entered as a combined cost in one of the two columns (Material or Labor) or broken out in the Material and Labor columns, but the costs are not to be entered in all three columns (do not total in the Item Cost column). The Item Cost column is only used in the program for the Storm Window costs.

### 2304 FUEL COSTS:

LWOs may enter approved work plan winter fuel cost data for their service area or utilize the default values in the NEAT setup. Seasonal average costs will be established from recognized suppliers and "spike" or season high costs will not be permitted.

For use of fuel costs other than the default values or values approved in agreement work plans, documentation must be submitted to the State of Michigan Weatherization Technical Division for approval prior to implementation.

LWOs may at their discretion utilize individual client fuel use data collected from the fuel supplier.

### 2305 FUEL ESCALATION RATES AND DISCOUNT RATE:

The Fuel Escalation Rates and Discount Rate used in the NEAT setup shall not be altered. LWOs shall use the default values supplied in the NEAT program files.

### 2306 ALLOWABLE NEAT CANDIDATE MEASURES:

The NEAT setup shall allow for the consideration of the following Candidate Measures/weatherization measures:

- Attic insulation (R-11, R-19, R-30, and R-38)
- Fill Ceiling Cavity
- Sill box insulation
- Foundation insulation
- Floor insulation (R-11 and R-19, exclude R-30)
- Wall insulation
- Wall insulation R11 batt
- Storm windows
- Replace heating system (80%-85%)
- High efficiency furnace (90+ %)
- Lighting Retrofits (Compact Fluorescent Light Bulbs)
- Refrigerator Replacement
- Water Heater Replacement

LWOs shall turn off the following Candidate Measures in the NEAT setup (they are not allowable weatherization measures):

- Floor insulation R-30 (other levels are allowable)
- Window Sealing
- Window Replacement
- Low E Windows
- Duct Insulation (Mandatory Weatherization Measure, see TWP 2.1.B)
- Window shading

- Sun screen Fabric
- Sun Screen Louvered
- Window Films
- Thermal Vent Damper
- Electric Vent Damper
- Intermittent Ignition Devices (IID)
- Electric Vent Damper IID
- \*Furnace Tune-up
- \*Smart Thermostat
- Replace Air Conditioners
- Evaporative Coolers
- Flame Retention Burner
- Replace Heat Pump
- \*Water Heater Tank Insulation
- \*Water Heater Pipe Insulation
- \*Low Flow Showerheads

\*Optional Weatherization Measure - can be turned on as an agency option to measure its' SIR in relation to the other measures the agency is utilizing. Optional measures turned on by a LWO must be performed if justified by SIR.

### 2307 WEATHER DATA:

Weather data is determined by the State of Michigan Weatherization Technical Division for each LWO, based on climatological data from National Oceanic & Atmospheric Administration (NOAA ,Ashville, North Carolina) for the agency service delivery area. The closest representative heating degree days supplied in NEAT will be assigned/setup.

Note: The chart on page 14 lists appropriate NEAT Weather Data to be used by the LWO. Alternative weather data may be used if submitted to and approved by the State of Michigan Weatherization Technical Division.

### 2308 KEY PARAMETERS:

The default values contained in the Key Parameters shall be utilized with the following exceptions:

- Economics: Minimum Acceptable SIR - 1.5
- Set Points: Daytime Heating Set point - Agency Discretion
- Night time heating set point - Agency Discretion
- Insulation and Heat Transfer: R-value Added by Foundation Wall Insulation Measure - 11
- R's/inch of "Other" Insulation Type - 3.14
- User Defined Insulation Type: User Defined Ceiling Insulation "Type 1" Name - F/GLASS BATT
- User Defined Ceiling Insulation "Rs/Inch" - 3.14
- User Defined Wall Insulation "Type 1" Name - F/GLASS BATT
- User Defined Wall Insulation "Type 1 R-Value" - 11
- User Defined Wall Insulation "Type 2" Name – Foam Core
- User Defined Wall Insulation "Type 2 R-Value" – 5

### 2309 MODIFICATIONS OF NEAT SETUP/PARAMETERS:

The NEAT Setup and Key Parameters may be modified as needed for a specific audit or audits with like variables. The parameter setup with a specific variable which may be applicable to like structures would be given a different name for the specific setup variance (LWO 0708) and a description of the setup variance shall be noted.

Example: For homes in which attic insulation cannot be addressed the Agency's Master NEAT Setup/Parameter file would be modified to eliminate attic insulation as a candidate measure and that file

would then be named (LWO 0708a) and described "Attic Insulation is not possible."

In cases where the NEAT Setup is not appropriate for a job, such as Candidate Measures which cannot be addressed on a job, such measures shall be temporarily turned off in the NEAT Setup.

Candidate Measures temporarily turned off or an agency specified measures variable in the NEAT Setup shall be entered as a "Comment" on the General Information screen of the NEAT audit and recorded on page 1 of the electronic Building Check and Job Order Sheet.

In cases where the Key Parameters (per this Subject) significantly vary from actual job conditions (e.g., the parameter for "Night Setback (F)" with a default value of 6 degrees and the client states they will utilize a 10 degree night temperature setback), Key Parameters can be modified temporarily for that job.

Any temporary modification of the NEAT Setup and/or Key Parameters for an individual job shall be entered as a "Comment" on the General Information screen of the NEAT audit and be documented on page one of the eBCJO for that job. The eBCJO shall also contain documentation as to why the Setup was modified.

Temporary modifications of the NEAT Setup and/or Key Parameters shall be returned to the original values for future jobs.

### **2310 REQUIRED DOCUMENTATION:**

LWOs shall submit to the State of Michigan Weatherization Technical Division written documentation of the changes to be made to the NEAT Setup and Key Parameters and why these changes are necessary for their agency prior to implementation and prior to any modification of the NEAT. In addition, documentation shall be provided relative to the effective date of changes in the Setup.

Justification for modification of winter fuel costs and/or weather data must be submitted to the State of Michigan Weatherization Technical Division for approval as part of the agreement work plan or prior to implementation if submitted separate from the work plan.

### **2311 FURNACE SIZING USING NEAT:**

In order to properly size furnaces using the NEAT, the setup shall be temporarily modified to reflect the actual weatherization measures/Candidate Measures which will be addressed. All Recommended Measures, resulting from an executed audit that will not be addressed shall be temporarily turned off in the Setup of Candidate Measures (e.g., measures not being addressed due to costs exceeding an LWO established labor and material cost limit, measures which cannot be completed due to client/job circumstances).

Candidate Measures temporarily turned off for the purpose of furnace sizing shall be entered as a "Comment" on the General Information screen of the NEAT audit and recorded on the eBCJO. Temporary modifications of the NEAT Setup and/or Key Parameters shall be returned to the original values for future jobs.

### **2312 FILE DOCUMENTS:**

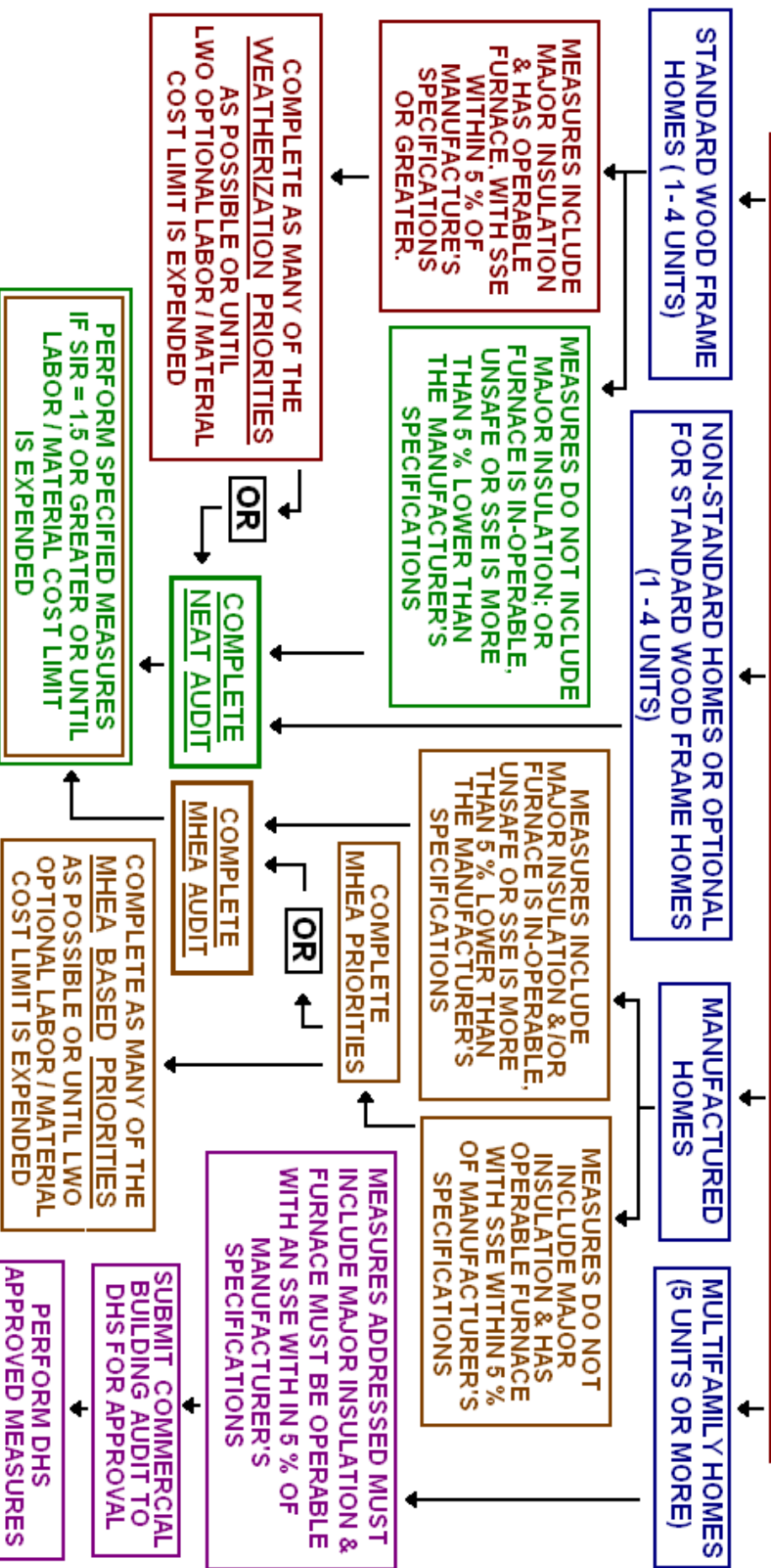
The client/job files for units weatherized using NEAT audits shall include:

- NEAT Job Input Summary Report
- NEAT Output Summary Report

<i>Agency</i>	<i>Acronym</i>	<i>Heating Degree Days</i>	<i>NEAT City</i>	<i>NEAT Degree Days</i>
Alger-Marquette Community Action Bureau	AMCAB	8390	Alpena	8208
Allegan County Resource Development Committee	ACRDC	6890	Grand Rapids	6949
Area Community Services Employment and Training Council	ACSET	6890	Grand Rapids	6949
Baraga-Houghton-Keweenaw Community Action Agency	BHKCAA	9400	Sault Sainte Marie	9409
Capitol Area Community Services	CACS	6940	Grand Rapids	6949
Chippewa-Luce Mackinac Comm Action & Human Res, Inc	CLMCA	9050	Sault Sainte Marie	9409
Community Action Agency of Jackson-Lenawee-Hillsdale	CAAJLH	6940	Grand Rapids	6949
Community Action Agency of South Central Michigan	CAASCM	6580	Grand Rapids	6949
Detroit Department of Human Services	DHSD	6290	Detroit	6730
Dickenson-Iron Community Services Agency	DICSA	8673	Alpena	8208
Downriver Community Conference	DCC	6290	Detroit	6730
Economic Opportunity Committee of St. Claire County, Inc	EOC	6564	Detroit	6730
Eight CAP, Inc	ECAP	7050	Flint	7103
Five CAP, Inc	FCAP	6950	Grand Rapids	6949
Genesee County Community Action Resource Department	GCCARD	7200	Flint	7200
Gogebic-Ontonagon Community Action Agency	GOCAA	8898	Sault Sainte Marie	9409
Human Development Commission	HDC	7200	Flint	7103
Kalamazoo County Community Action Bureau	KCCAB	6260	Detroit	6730
Macomb County Community Service Agency	MCCSA	6290	Detroit	6730
Menominee-Delta-Schoolcraft Community Action Agency	MDSCAA	8481	Alpena	8208
Mid-Michigan Community Action Agency	MMCAA	7017	Flint	7103
Monroe County Opportunity Program	MCOP	6290	Detroit	6730
Muskegon-Oceana Community Action Partnership, Inc	MOCAP	6950	Grand Rapids	6949
Northeast Michigan Community Services Agency	NEMCSA	8510	Alpena	8208
Northwest Michigan Human Services Agency	NMHSa	7700	Traverse City	7744
Oakland-Livingston Human Services Agency	OLHSA	6290	Detroit	6730
Ottawa County Community Action Agency	OCCAA	6890	Grand Rapids	6949
Saginaw County Community Action Committee, Inc.	SCCAC	7120	Flint	7103
Southwest Michigan Community Action Agency	SMCAA	6260	Detroit	6730
Washtnaw County Human Services Department	WCHSD	6290	Detroit	6730
Wayne County Weatherization	WCWx	6290	Detroit	6730
Wayne Metropolitan Community Services Agency	WMCSA	6290	Detroit	6730

# MICHIGAN WEATHERIZATION PROGRAM AUDIT REQUIREMENTS

**\* ALL AUDITS (BOTH PRE-INSPECTIONS AND POST INSPECTIONS) SHALL INCLUDE \*  
COMBUSTION APPLIANCE, HEALTH & SAFETY, AND BLOWER DOOR TESTING**



## 2350/2360 MANUFACTURED HOME ENERGY AUDITS (MHEA)

### 2351 NATIONAL ENERGY AUDIT TOOL (NEAT) SETUP:

This Subject contains requirements relative to the Setup of the MHEA Version 7.4.3 for use to complete audits as specified in Section 2450. It also includes instruction relative to the Setup of the MHEA for use in sizing furnaces.

### 2352 NAMING AGENCY'S MASTER NEAT/MHEA SETUP/PARAMETER FILE:

No additional inputs are required from those applied in instructions listed in Section 2302 for naming and linking to the agency setup/parameter PY708.mdb for use of NEAT/MHEA 7.4.3.

### 2353 MATERIAL AND LABOR COSTS:

LWOs shall enter their material/labor costs for the allowable MHEA measures. The extent of the work for each measure which these costs shall represent is specified in Section 2450.

Refrigerator replacement and Domestic Water Heater Replacement items are not common to the NEAT entered resources and must be separately entered to be selected from drop down menus as provided by NEAT.

Material and Labor costs can be entered as a combined cost in one of the two columns (Material or Labor) or broken out in the Material and Labor columns, but the costs are not to be entered in all three columns (do not total in the Item Cost column). The Item Cost column is only used in the program for Storm Window costs.

### 2354 FUEL COSTS:

LWOs may enter approved work plan winter fuel cost data for their service area or utilize the default values in the MHEA setup. Seasonal average costs will be established from recognized suppliers and "spike" or season high costs will not be permitted.

For use of fuel costs other than the default values or values approved in agreement work plans, documentation must be submitted to the State of Michigan Weatherization Technical Division for approval prior to implementation.

LWOs may at their discretion utilize individual client fuel use data collected from the fuel supplier.

### 2355 FUEL ESCALATION RATES AND DISCOUNT RATE:

The Fuel Escalation Rates and Discount Rate used in the NEAT setup shall not be altered. LWOs shall use the default values supplied in the NEAT/MHEA program files.

### 2356 ALLOWABLE MHEA CANDIDATE MEASURES:

The MHEA setup shall allow for the consideration of the following Candidate Measures/weatherization measures:

- General air sealing (Major bypasses are mandatory regardless of SIR)
- Wall fiberglass batt insulation (if open cavity)
- Wall fiberglass batt insulation in Addition
- Wall cellulose loose insulation in Addition
- Wall fiberglass loose insulation

- Wall fiberglass loose insulation in Addition
- Floor fiberglass loose insulation
- Floor fiberglass loose insulation in Addition
- Roof cellulose loose insulation in Addition
- Roof fiberglass loose insulation
- Roof fiberglass loose insulation in Addition
- Replace Marked doors (mandatory)
- Glass storm windows
- Storm doors (replacement of single "combo" prime door allowable as major bypass)
- Storm door in Addition
- Glass storm windows in Addition
- Replace heating system
- Lighting Retrofit
- Refrigerator replacement
- Water heater replacement

LWOs shall turn off the following Candidate Measures in the MHEA setup (they are not allowable weatherization measures):

- Seal ducts (mandatory measure)
- Wall cellulose loose insulation
- Floor cellulose loose insulation
- Roof cellulose loose insulation
- Add skirting
- Add skirting on Addition
- White coat roof
- White coat roof on Addition
- Replace wooden doors (replaced as major bypass)
- Replace wooden door in Addition (replaced as major bypass)
- Replace single paned windows
- Replace single paned windows in Addition
- Plastic storm windows
- Add awning
- Add awning in Addition
- Add shade screens
- Add shade screens in Addition
- \*Setback thermostat
- \*Tune heating
- Evaporative cooling
- Replace dx cooling equip
- \*Water heater tank insulation
- \*Water heater pipe insulation
- \*Low flow showerheads

\*Optional Weatherization Measure - can be turned on as an agency option to measure its' SIR in relation to the other measures the agency is utilizing. Optional measures turned on by a LWO must be performed if justified by SIR.

### 2357 WEATHER DATA:

Weather data is determined by the State of Michigan Weatherization Technical Division for each LWO, based on climatological data from National Oceanic & Atmospheric Administration (NOAA ,Ashville, North Carolina) for the agency service delivery area. The closest representative heating degree days supplied in NEAT/MHEA will be assigned/setup.

Note: The chart on page 14 lists appropriate NEAT/MHEA Weather Data to be used by the LWO. Alternative weather data may be used if submitted to and approved by the State of Michigan Weatherization Technical Division.



## 2358 KEY PARAMETERS:

The default values contained in the Key Parameters shall be utilized with the following exceptions:

Economics:

- Minimum Acceptable SIR: 1.5
- Spending limit for package of measures: agency option (applies only if agency work plan includes a spending limit approved by the State of Michigan and applied to all homes equally throughout the grant period)

Set Points: agency option

Insulation: bag size for loose fiberglass insulation, as available to agency

## 2359 MODIFICATIONS OF NEAT/MHEA SETUP/PARAMETERS:

The NEAT/MHEA Setup and Key Parameters may be modified as needed for a specific audit or audits with like variables. The parameter setup with a specific variable which may be applicable to like structures would be given a different name for the specific setup variance (LWO 0708) and a description of the setup variance shall be noted.

Example: For manufactured homes in which ceiling cavity insulation cannot be addressed the Agency's Master NEAT/MHEA Setup/Parameter file would be modified to eliminate ceiling cavity insulation as a candidate measure and that file would then be named (LWO 0708a) and described "Ceiling Cavity Insulation is not possible."

In cases where the NEAT/MHEA Setup is not appropriate for a job, such as Candidate Measures which cannot be addressed on a job, such measures shall be temporarily turned off in the NEAT/MHEA Setup.

Candidate Measures temporarily turned off or an agency specified measures variable in the MHEA Setup shall be entered as a "Comment" on the General Information screen of the MHEA audit and recorded on page 1 of the electronic Building Check and Job Order Sheet.

In cases where the Key Parameters (per this Subject) significantly vary from actual job conditions (e.g., the parameter for "Night Setback (F)" with a default value of 6 degrees and the client states they will utilize a 10 degree night temperature setback), Key Parameters can be modified temporarily for that job.

Any temporary modification of the MHEA Setup and/or Key Parameters for an individual job shall entered as a "Comment" on the General Information screen of the MHEA audit and be documented on page one of the eBCJO for that job. The eBCJO shall also contain documentation as to why the Setup was modified.

Temporary modifications of the MHEA Setup and/or Key Parameters shall be returned to the original values for future jobs.

## 2360 REQUIRED DOCUMENTATION:

LWOs shall submit to the State of Michigan Weatherization Technical Division written documentation of the changes to be made to the MHEA Setup and Key Parameters and why these changes are necessary for their agency prior to implementation and prior to any modification of the MHEA. In addition, documentation shall be provided relative to the effective date of changes in the Setup.

Justification for modification of winter fuel costs and/or weather data must be submitted to the State of Michigan Weatherization Technical Division for approval as part of the agreement work plan or prior to implementation if submitted separate from the work plan.

## 2361 FURNACE SIZING USING MHEA:

In order to properly size furnaces using the MHEA, the setup shall be temporarily modified to reflect the actual weatherization measures/Candidate Measures which will be addressed. All Recommended Measures, resulting from an executed audit that will not be addressed shall be temporarily turned off in the Setup of Candidate Measures (e.g., measures not being addressed due to costs exceeding an LWO established labor and material cost limit, measures which cannot be completed due to client/job circumstances).

Candidate Measures temporarily turned off for the purpose of furnace sizing shall be entered as a "Comment" on the General Information screen of the MHEA audit and recorded on the eBCJO. Temporary modifications of the MHEA Setup and/or Key Parameters shall be returned to the original values for future jobs.

## 2362 FILE DOCUMENTS:

The client/job files for units weatherized using MHEA audits shall include:

- MHEA Job Input Summary Report
- MHEA Output Summary Report

## 2400 COMPLETION OF NEAT AUDITS

The completion of an individual NEAT audit (Sections 2200 and 2300 state when NEAT Audits shall be utilized) will require a thorough pre-inspection, including completion of the electronic Building Check and Job Order Sheet which includes all information as required to complete all NEAT data screens. Any attachments containing audit-related additional information shall be referenced on the eBCJO and included as part of the client file.

Data entries required to complete individual NEAT audits shall be completed in compliance with the NEAT Manual instructions and in accordance with the following:

## 2401 GENERAL INFORMATION (PERTAINING TO THE HOME AND AUDIT):

- Client Information: Client's name, address, etc.
- Audit Information: Audit date, Auditor (Inspector), Job Identifier (Agency Job Number)
- House Data: Number of Conditioned Stories, Living Space Floor Area, and Average Number of occupants.

## 2402 DUCTS AND INFILTRATION:

- Pre-Infiltration Reduction Leakage Rate from Blower Door (CFM): The CFM @ 50 Pa as determined by pre-inspection blower door testing (Section 4000). In cases where 50 Pa House Pressure cannot be reached, enter the actual house pressure.
- Post-Infiltration Leakage Rate from Blower Door (CFM): The post weatherization CFM @ 50 Pa projected (the higher of the "CFM Percent" projection based on ACH percent reduction requirements or the "Minimum CFM"/higher of CFM Persons or CFM Bedrooms).
- Cost of Air Leakage Rate Reduction (\$): This includes the estimated labor and material costs of addressing Major Bypasses and Infiltration/Exfiltration Measures as required to achieve projected post weatherization CFM Goal.
- Evaluate Duct Sealing: The box will be un-checked as duct sealing is a required measure of Michigan's WAP.

## 2403 EXTERIOR WALLS:

The cost incorporated in the audit generally covers agency pricing for labor and materials required to complete normal wall preparation and insulation requirements (e.g., drilling holes, sealing minor openings where insulation may escape, blowing walls to an R-11-13 level, and plugging holes).

Added Insulation Cost may include the additional cost of insulating a deeper wall (e.g., 2 x 6 walls), repairs needed prior to insulating (e.g., installation of "S" type fuses, patching siding), and other additional costs (e.g., if siding removal/conditions result in additional costs to complete wall insulation). An explanation of the reason for the "Added Cost" shall be identified in the wall Comments section of the NEAT audit Wall screen and costs shall be itemized in the "Additional Wall Insulation Costs" section of the eBCJO. As an alternative, such costs may be recorded as "Incidental Repair Costs" or "Miscellaneous Costs" on the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs (see Section 2410).

## 2404 WINDOWS:

Prime windows may be addressed as "Major Bypasses" or Infiltration/Exfiltration Measures (see Section 3100) when determined necessary by the pre-inspection/blower door testing.

NEAT will evaluate SIRs for new storm windows (the NEAT will not automatically assign a Window Code; the code is generated by the inspector for each line entry of the windows e.g., WD1). The cost incorporated in the audit for Michigan for the storm windows will cover agency pricing for the labor and materials to complete the installation of a storm up to a maximum of 101 united inches (width + height). Storm cost (\$) (labor and material) shall be entered only for storms over 101 united inches; this will overwrite the default price.

Basement storms shall be entered in the "Miscellaneous Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and computer data entry screen of the NEAT audit, Itemized Costs (see Section 2410).

## 2405 DOORS:

Prime doors and storm door repairs may be addressed as "Major Bypasses" or Infiltration/Exfiltration Measures (see Section 3100) when determined necessary by the pre-inspection/blower door testing. NEAT will not automatically assign a Door Code; the code is generated by the inspector for each line entry of the doors (e.g., DR1).

## 2406 UNFINISHED ATTIC AREAS/FINISHED ATTIC AREAS:

The cost incorporated in the audit generally covers agency pricing for labor and materials to complete normal insulation and attic prep requirements (e.g., barriers for heat sources, sealing openings, insulation to the stated R value, insulate and weather strip an existing attic access).

Additional Installation Cost may include labor and material costs for venting, a new attic access, pipe wrap, venting of ceiling fans, and repairs needed prior to insulating (e.g., patching roof, repairing wiring). Such costs shall be identified in the Comments section of the NEAT audit for this measure and the costs shall be itemized in the "Additional Attic Insulation and/or Ventilation Costs" section of the eBCJO. As an alternative, these costs may be recorded as "Incidental Repair Costs" or "Miscellaneous Costs" on the eBCJO (and totals recorded as "Itemized Costs") and entered in the Itemized Costs computer data entry screen of the NEAT audit (see page 6 of this Section/Subject).

Separate attic areas which differ (e.g., main attic is un-insulated and a separate attic for an addition has an existing R-19) shall be assigned different Measure Numbers. In cases where existing insulation is present, the NEAT entry shall still call for Additional Insulation so as to allow NEAT to determine whether additional insulation is cost effective (don't "zero" out Additional Insulation because of existing insulation,

unless there is another justified reason such as moisture problems which would be entered in the "Comments" section and noted on the eBCJO).

If attic insulation is not being addressed but attic ventilation is needed (refer to section 2600) ventilation costs shall be entered in the Itemized Costs computer data entry screen of the NEAT audit. Costs shall be entered in the "Miscellaneous Costs" and "Itemized Costs" section of the eBCJO (and totals recorded as "Itemized Costs").

### 2407 FOUNDATION SPACES:

The cost incorporated in the audit to address foundation areas ("Sill Insulation", "Floor Insulation", or "Foundation Insulation") generally covers agency pricing for labor and materials to complete normal prep requirements, insulating to the stated R value, and insulating and weather stripping an existing access.

Added Cost for foundation spaces may include labor and material costs for venting, a new access, pipe wrap and repairs needed prior to insulation (e.g., replace foundation block). Such costs shall be identified in the Comments column of the NEAT audit for this measure. These costs shall be recorded as "Additional Foundation and/or Band Joist Insulation Costs" on the eBCJO. As an alternative, such costs may be recorded as "Incidental Repair Costs" or "Miscellaneous Costs" on the eBCJO (and totals recorded as "Itemized Costs") and entered in the Itemized Costs computer data entry screen of the NEAT audit (see Section 2411).

Combined foundation areas may be separated by assigning different Measure Numbers (e.g., a heated basement and unheated crawl space would be listed separately and have different Measure Numbers assigned).

The Type shall be indicated for each foundation area in accordance with the NEAT Manual instructions for Foundation Spaces (e.g., "Conditioned" - "means the space has active thermostat control").

The NEAT audit will not allow a vented (Type "V") foundation area to be addressed with perimeter insulation as it considers it "Vented Non-Conditioned". The intent in Michigan of addressing perimeter insulation in a vented foundation area is that it is either "Conditioned" or "Unintentionally Conditioned" due to existing circumstances and operable vents are in place or can be added to replace fixed vents. Therefore in these situations foundation areas are to be entered in the audit as "Conditioned" or "Unintentionally Conditioned" and appropriate steps taken for operable vents.

If a foundation area cannot be addressed (e.g., basement living area with dry walled ceiling), this area can be excluded from evaluation by entering "None" in the "Foundation Insulation Mode" section. All other data entries shall be completed in this section as required in the NEAT manual.

In cases where a foundation area cannot be addressed or only sill box insulation is being evaluated, the reason shall be documented on the eBCJO and in the Comments section of the NEAT audit for this foundation area.

If foundation insulation is not being addressed (e.g., existing) but foundation ventilation is needed (as determined by the pre-inspector or per requirements of Section 2900), ventilation costs shall be entered in the "Miscellaneous Costs" and "Itemized Costs" sections of the eBCJO and costs shall be entered in the Itemized Costs computer data entry screen of the NEAT audit (see Section 2411).

### 2408 LIGHTING:

A lighting code shall be assigned by the inspector for all incandescent light bulbs to be replaced with compact fluorescent light bulbs. Other required information shall be completed in the NEAT audit relative to each bulb being replaced. (All bulbs assessed by NEAT with an SIR  $\geq 1.5$  may be replaced)

## 2409 AIR CONDITIONERS – CENTRAL/WINDOW:

Entries shall be completed on this NEAT audit screen whenever central and/or window air conditioners are being utilized. Information relative to air conditioning shall be recorded in the "NEAT-Air Conditioners" section of the eBCJO.

## 2410 HEATING SYSTEMS/PRIMARY FURNACE - BOILER/SPACE HEATERS/OTHER SYSTEMS:

These entries include data for various types of heating systems/duct insulation. Testing shall be completed by a certified inspector or a licensed mechanical contractor. In lieu of testing (testing is required unless there is a specific reason it cannot be completed, which shall be documented in the Comments section of the NEAT audit and on the eBCJO), data can be taken from the heating system data plate and entered in the appropriate area on the NEAT audit (e.g., furnace inoperable or unsafe to operate).

If the kBtu information is not available, the input of the furnace can be determined by clocking the meter. For heating systems without an efficiency rating available and if efficiency testing is not possible to perform, the following guidelines can be utilized:

Gas - furnace - 70 percent, boiler - 74 percent, space Heater - 70 percent  
Oil - furnace - 68 percent, boiler - 70 percent, space Heater - 70 percent  
Wood - 50 percent

When a heating system is missing or inoperable (or unsafe to operate) and beyond economic repair, NEAT must be run to size a replacement or a complete Manual "J" may be substituted. This non-energy justified (SIR) replacement may be funded as "health and safety" with DOE funding, or leverage funding, but not as a DOE energy measure. To properly size a replacement furnace and assess energy measures appropriate for the home with the replacement furnace considered, adjustments may be required, with additional processing of NEAT after all other data has been input.

1. On the Heating System tab, in place of the existing furnace (if a heating system exists), complete all data fields for the selected replacement furnace.
  - a. Select "Good" for condition
  - b. Select "Don't Replace" for status.
2. Select the "Itemized Cost" tab.
  - a. Enter "Furnace Replacement" in the "Description" block on the available record.
  - b. Enter total cost for replacement in the cost field.
  - c. Do not check "Include in SIR?" box.
  - d. List the material required in the "Material" field
  - e. Indicate reason for the non-energy based change in the "Comment" field. Run the audit.
3. Evaluate the NEAT Output Report upon completion of the "run."
  - a. Under the "Approximate Manual J Component Contributions to Peak Heat Load" heading, at the "Output Required" row in the Post Retrofit Load (BTU/h) column is the NEAT recommended post-retrofit furnace sizing.
  - b. Match the output indicated to the nearest size furnace available above the post-retrofit recommended size and enter that figure in place of data entered previously for the existing furnace.
  - c. Re-run the audit and validate the post-retrofit sizing is appropriate to the entered furnace selected for replacement.

Note: This process allows sizing of a furnace consistent with the configuration of the home with added measures identified as economical in the audit installed (duplicated in Weatherization Processes and Procedures Manual "WPPM"). It is important that the selected measures be reviewed with the client and installed as indicated in the audit for the indicated sizing to be valid. Refusal of an audit measure or a

subsequent determination that identified measure can not be installed may result in over or under sizing of the furnace or degrade the savings indicated by the audit.

For a furnace/boiler/space heater with a steady state efficiency of less than "70%" (use the actual tested SSE in the NEAT Audit and select "Optional" heating system retrofit).

Vent dampers are not an approved weatherization measure in Michigan and shall not be recommended in the NEAT audit.

### 2411 ITEMIZED COSTS:

"Health and Safety Costs" - Include all labor and material costs projected for health and safety measures. This includes mandatory health and safety measures (smoke detectors and clothes dryer venting) and optional health and safety measures, as determined by the LWO, to be completed on a home. Health and safety measures shall be identified and broken out in the "Health and Safety Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs, as the following example indicates:

The smoke detector costs are included in the audit as a "Health and Safety" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Health and Safety I" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 1 Smoke Detector) in the Materials section.
5. If there are other "Health & Safety" items or measures to be listed, call the next item "Health & Safety II", etc.

"Duct Sealing/Repair/Replacement Costs" - Include all labor and material costs projected to complete these measures. These costs shall be broken out in the appropriate sections of the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs, as the following example indicates:

The duct sealing costs are included in the audit as "duct sealing" by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "duct seal/repair/replacement" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 15ft duct seal) in the Materials section.
5. (see Health & Safety example above for duplicate duct seal/repair/replacement items.)

"Incidental Repair Costs" - Include all necessary labor and material costs projected to complete "incidental repairs" which are not being entered as additional installation costs relative to a weatherization measure. These costs shall be identified in the "Incidental Repair Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs as the following example indicates:

Chimney liner costs are included in the audit as "Incidental Repair Costs" by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Incidental Repair" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 25ft chimney liner) in the Materials section.
5. (see above example for duplicate incidental repair items.)

"Miscellaneous Costs" - Include all labor and material costs required to complete basement storms, incidental measures (e.g., venting an attic when attic insulation is not being addressed, pipe insulation), etc. These costs shall be broken out in the "Miscellaneous Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs, as the following example indicates:

The attic venting costs are included in the audit as a "Miscellaneous" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Miscellaneous" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 4 R60 Roof Vents) in the Materials section.
5. (see above example for duplicate Miscellaneous items.)

"Optional Weatherization Measures Costs" - Include all labor and material costs required to address furnace tune-ups, clock setback thermostats, water heater insulation and low flow shower heads. These costs shall be broken out in the "Optional Weatherization Measures Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the NEAT audit as Itemized Costs, as the following example indicates:

The furnace tune-up costs are included in the audit as an "Optional" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Optional" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., Furnace Tune-up) in the Materials section.
5. (see above example for duplicate duct seal/repair/replacement items.)

## 2450/2460 COMPLETION OF MHEA AUDITS

The completion of an individual MHEA audit (Sections 2200 and 2350 state when MHEA Audits shall be utilized) will require a thorough pre-inspection, including completion of the electronic Building Check and Job Order Sheet which includes all information as required to complete all MHEA data screens. Any attachments containing audit-related additional information shall be referenced on the eBCJO and included as part of the client file.

Data entries required to complete individual MHEA audits shall be completed in compliance with the MHEA Manual instructions and in accordance with the following:

### 2451 GENERAL MHEA AUDIT INFORMATION:

- Client Information: Client's name, address, etc.
- Audit Information: Audit date, Auditor (Inspector), Job Identifier (Agency Job Number)
- House Data: Length, Width, Height, Shielding, Leakiness, and Average Number of Occupants, and indicate if Outdoor Water Heater Closet is present.

### 2452 DUCTS AND INFILTRATION:

- Pre-Infiltration Reduction Leakage Rate from Blower Door (CFM): The CFM @ 50 Pa as determined by pre-inspection blower door testing (Section 4000). In cases where 50 Pa House Pressure cannot be reached, enter the actual house pressure.
- Post-Infiltration Leakage Rate from Blower Door (CFM): The post weatherization CFM @ 50 Pa projected (the higher of the "CFM Percent" projection based on ACH percent reduction requirements or the "Minimum CFM"/higher of CFM Persons or CFM Bedrooms).
- Cost of Air Leakage Rate Reduction (\$): This includes the estimated labor and material costs

of addressing Major Bypasses and Infiltration/Exfiltration Measures as required to achieve projected post weatherization CFM Goal.

- Evaluate Duct Sealing: The box will be un-checked as duct sealing is a required measure of Michigan's WAP.

#### 2452 EXTERIOR WALLS:

The cost included in the audit generally covers material, labor, and minor activities required to complete the wall insulation measure (sealing minor opening to prevent escape of insulation, access to wall cavities, closing insulation access openings, and blowing to an R-11 to R-13 level).

Added insulation cost may include the additional cost of insulating a deeper wall cavity or other added access or closure cost due to differences in wall covering materials or other unusual circumstances. A contractor "setup" fee may also be listed as an added cost. Added cost are a "fixed value" entry for a given measure component, not a unit measure such as square foot, bag, roll, or other input that would normally be calculated.

#### 2453 WINDOWS:

Prime windows may be addressed as "Major Bypasses" or Infiltration/Exfiltration Measures (see Section 3100) when determined necessary by the pre-inspection/blower door testing.

MHEA will evaluate SIRs for new storm windows (the MHEA will not automatically assign a Window Code; the code is generated by the inspector for each line entry of the windows e.g., WD1). Storm window prices are entered into setup based on "square foot" measurement and there is no over-ride to indicate actual cost as provided in NEAT.

#### 2454 DOORS:

Prime doors and storm door repairs may be addressed as "Major Bypasses" or Infiltration/Exfiltration Measures (see Section 3100) when determined necessary by the pre-inspection/blower door testing. Check the "replacement Door Required" check box to indicate need for door replacement without regard to SIR. MHEA will not automatically assign a Door Code; the code is generated by the inspector for each line entry of the doors (e.g., DR1).

#### 2455 CEILING CAVITIES (AND ATTIC SPACES OF ADDITIONS):

Indicate the Ceiling Type and other identifying data, as well as existing type and level of insulation. Measure pricing includes the normal cost associated with accessing, minor preparation, and closure of areas to be insulated.

Added cost is a "bulk cost" price rather than based on insulation measure pricing (labor and material per bag for blown, per square foot for fiberglass batt). This may include providing access where none exist, venting required by insulation, or a "setup" fee assessed by a contractor to perform ceiling cavity insulation on manufactured homes.

#### 2456 FLOOR AREA/FOUNDATIONS:

Descriptive information is entered concerning the orientation of joist, application of existing insulation, and floor/belly configuration. Cost associated with usual access to apply insulation are included in the labor and material prices reflected in setup.

Added cost may include other than minor repair of the "belly pan" or unusual set up processes to apply the floor/belly area insulation measure. Added cost are an overall cost entry, not based on unit measures (such as square feet, bags, rolls, or other measure pricing units of measure).



## 2457 LIGHTING:

A lighting code shall be assigned by the inspector for all incandescent light bulbs to be replaced with compact fluorescent light bulbs. Other required information shall be completed in the MHEA audit relative to each bulb being replaced. (All bulbs assessed by MHEA with an SIR  $\geq 1.5$  may be replaced)

Added cost may include a requirement to replace fixture covers (globes) with like style in manufactured homes to accommodate the increased bulk of CFL bulbs.

## 2458 AIR-CONDITIONERS – CENTRAL/WINDOW:

Entries shall be completed on this MHEA audit screen whenever central and/or room air conditioners are being utilized. Information relative to air conditioning shall be recorded in the "MHEA-Air Conditioners" section of the eBCJO.

## 2459 HEATING SYSTEMS:

The existing furnace information is entered on Primary Heating Systems form. A secondary system can only be added if the Primary System is entered at less than 100% of heat supplied. Replacement required can be indicated on the Heating Systems Replacement form. Furnace systems may be replaced based on efficiency issues or as Health and Safety Measures. Changing fuel sources at time of replacement must be cost (SIR) justified.

Cost associated with a furnace replacement, including added cost (associated with fuel switching, new roof jack, or other cost beyond furnace material and labor) must be entered into the MHEA setup prior to conducting the audit, as there is no input to MHEA that allows "over-ride" pricing.

## 2460 ITEMIZED COSTS:

"Health and Safety Costs" - Include all labor and material costs projected for health and safety measures. This includes mandatory health and safety measures (smoke detectors and clothes dryer venting) and optional health and safety measures, as determined by the LWO, to be completed on a home. Health and safety measures shall be identified and broken out in the "Health and Safety Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the MHEA audit as Itemized Costs, as the following example indicates:

The smoke detector and clothes dryer venting costs are included in the audit as a "Health and Safety" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Health and Safety I" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 1 Smoke Detector) in the Materials section.
5. If there are other "Health & Safety" items or measures to be listed, call the next item "Health & Safety II", etc.

"Duct Sealing/Repair/Replacement Costs" - Include all labor and material costs projected to complete these measures. These costs shall be broken out in the appropriate sections of the eBCJO (and totals recorded as "Itemized Costs") and entered in the MHEA audit as Itemized Costs, as the following example indicates:

The duct sealing costs are included in the audit as "duct sealing" by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "duct seal/repair/replacement" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 15ft duct seal) in the Materials section.
5. (see Health & Safety example above for duplicate duct seal/repair/replacement items.)

"Incidental Repair Costs" - Include all necessary labor and material costs projected to complete "incidental repairs" which are not being entered as additional installation costs relative to a weatherization measure. These costs shall be identified in the "Incidental Repair Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the MHEA audit as Itemized Costs as the following example indicates:

1. Enter "Incidental Repair" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 25ft chimney liner) in the Materials section.
5. (see above example for duplicate incidental repair items.)

"Miscellaneous Costs" - Include all labor and material costs required to complete basement storms, incidental measures (e.g., venting an attic when attic insulation is not being addressed, pipe insulation), etc. These costs shall be broken out in the "Miscellaneous Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the MHEA audit as Itemized Costs, as the following example indicates:

The attic venting costs are included in the audit as a "Miscellaneous" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Miscellaneous" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., 4 R60 Roof Vents) in the Materials section.
5. (see above example for duplicate Miscellaneous items.)

"Optional Weatherization Measures Costs" - Include all labor and material costs required to address furnace tune-ups, clock setback thermostats, water heater insulation and low flow shower heads. These costs shall be broken out in the "Optional Weatherization Measures Costs" section of the eBCJO (and totals recorded as "Itemized Costs") and entered in the MHEA audit as Itemized Costs, as the following example indicates:

The furnace tune-up costs are included in the audit as an "Optional" measure by inserting the data in the computer screen Itemized Costs as follows:

1. Enter "Optional" in the Description section;
2. Enter total material and labor costs in the Cost section;
3. Select the box (check) in the Include in SIR section; and
4. Enter the materials (e.g., Furnace Tune-up) in the Materials section.
5. (see above example for duplicate duct seal/repair/replacement items.)

## 2500 WEATHERIZATION MEASURE STANDARDS AND SPECIFICATIONS

Standards and specifications pertaining to Weatherization Measures are contained in this section.

### 2501 ATTIC INSULATION:

When called for by the NEAT/MHEA audit or the measures priorities all attic areas (attic floors, knee walls, and slopes) between heated and unheated areas shall be insulated.

## 2502 INSULATION LEVELS:

Install ceiling insulation at the level determined by the NEAT/MHEA audit.

Homes weatherized in accordance with the priorities system for standard wood frame construction Attic Insulation shall be brought up to R-30 if funding permits, regardless of amount of existing insulation – R-38 if homes are heated by fuels other than natural gas, and degree days exceeding 6300.

## 2503 PRECAUTIONS AND ATTIC PREPARATION REQUIREMENTS:

Inspect the areas to be insulated to identify potential safety hazards. Ensure that the ceiling and roof are structurally sound and able to support additional loads. Also, ensure that there are no uncorrected moisture problems. If any such problems are not corrected, the ceiling shall not be insulated. Junction boxes and wire drops do not require a barrier, but may be blown over after it has been verified that they are covered and in good repair. It is also recommended (at agency discretion) that junction boxes which are blown over be flagged.

Identify and provide barriers for all recessed lighting fixtures (including wiring compartment and ballasts), furnaces, chimneys, flues, knob and tube wiring, motors, vents/fans, door bell transformers, and other heat producing devices in all areas where insulation is to be installed. Install noncombustible barriers (e.g., metal or unfaced mineral fiber batts) around all heat producing sources to permanently maintain a minimum 3" clearance from lined chimneys and cellulose insulation (clearance of insulation from attic furnaces and other heat producing sources must be provided in accordance with the governing code). All barriers shall extend at least 2" above the height of the finished insulation. Do not cover these devices so as to entrap heat or prevent the free circulation of air unless they are approved for this purpose. Attic ceiling access barriers are to be made of a rigid material (e.g. plywood, pine, etc.). Fiberglass batts (extending 15" minimum from perimeter of access) may be used in a ceiling accesses where occupants do not access or use the area for storage purposes. The barrier shall extend 2" above insulation without gaps and vapor barrier removed if stacked to build up to needed level.

In the case of wiring that is cracked, frayed, deteriorated, or otherwise in question, do not add insulation to this area (unless the wiring is inspected and repaired by a licensed electrician).

Dryer, kitchen, and bath fan vents which terminate in the attic shall be extended to the outside. Duct work for venting shall be aluminum or galvanized sheet metal, or a labeled aluminum flex duct. Any vent duct passing through the unheated attic shall be insulated. Refer to section 2700. Vents so extended shall be equipped with a water-proof cap with a back damper.

Heat ducts and pipes passing through unheated attic areas shall be insulated. Before insulating, ducts and pipes shall be inspected. Ducts shall be sealed, and supported. Refer to section 2700.

In homes that have soffit vents either in place or to be installed, some form of barrier must be installed to assure that insulation does not block the vent; thus, allowing for a free flow of air.

In no case shall any vent be blocked.

Prior to insulation, all by-passes between heated and unheated areas shall be air-sealed (e.g., ceiling penetrations, balloon frame construction, floor cavity below knee wall) and all venting and attic prep requirements shall be completed. Refer to section 3100 Infiltration/Exfiltration/Major Bypass Measures.

## 2504 CEILING INSULATION APPLICATION:

Install all insulation material in accordance with requirements of the governing code and the manufacturer's recommendations and keep it dry and free of extraneous materials.

Insulation left exposed to the interior shall have a flame spread classification not to exceed 150.

## 2505 KNEEWALL INSULATION APPLICATION:

Unheated knee wall areas adjoining a heated area shall be insulated to a minimum R-11.

Inspect the area to be insulated to identify potential safety hazards, defective wiring, and heat-producing devices, etc.

Install a minimum R-11 batt or blanket-type insulation. If a vapor barrier exists, install vapor barrier on the warm (heated) side of the wall and secure insulation (without compressing) within stud space of knee wall. Ensure that insulation fills the stud space.

## 2506 SLOPED CEILING INSULATION APPLICATION:

Inspect the area to be insulated to identify potential safety problems.

Sloped ceiling areas can be insulated with batt or blanket-type insulation, or the cavity between the sloped ceiling and roof can be blown with loose fill insulation.

Insulation shall be placed to allow an air space across the top of the slope cavity. Batts of less thickness than the depth of the cavity shall be used. Loose fill depth shall be limited by installing baffles within each cavity, where possible. If baffles cannot be placed, a shallow blow shall be completed so as to leave an air space above the insulation.

As an alternative, sloped ceiling areas can be blown full to a high density (dense-pack). In such cases, cavities shall be air sealed from other attic spaces.

If the insulation installed has a vapor barrier, it must be installed on the warm (heated) side of the ceiling. Provide a three-inch minimum clearance around all heat-producing sources.

## 2600 ATTIC VENTILATION

Proper and adequate ventilation must be included to ensure the effectiveness of the insulation and guard against deterioration caused by moisture accumulation. Ventilation is mandatory whenever ceiling insulation (R-19 or greater) exists or is to be added.

### 2601 VENTILATION REQUIREMENTS (FORMULAS):

If only high vents can be installed, a minimum ratio of 1/150 is required (one square foot net free area of ventilation for each 150 square feet of ceiling area). (example: 1 square inch of vent / 1.04 square feet of ceiling). Where at least 50 percent of venting is provided by soffit vents, and at least 50 percent of the venting is located as high sources of ventilation (minimum of three feet above soffit vents), a minimum ratio of 1/300 is allowed (example: 1 square inch of vent / 2.08 square feet of ceiling). Existing vapor barriers, high and low venting (50/50 split), and good vent distribution shall be considered when determining venting needs.

### 2602 MICHIGAN RESIDENTIAL CODE 2003 EDITION, SECTION R806 ROOF VENTILATION R806.2 MINIMUM AREA:

As an alternative, the net free cross-ventilation area may be reduced to 1 to 300 when a vapor barrier having a transmission rate not exceeding 1 perm (57.4 mg/s\*m<sup>2</sup>\*Pa) is installed on the warm side of the ceiling.

## 2603 VENT PLACEMENT, STANDARDS AND REQUIREMENTS:

Ventilators shall be placed so as to eliminate still air pockets in the attic.

Vent openings must be a minimum of 1/8" and may not exceed 1/4". Large "can" type roof vents (144 square inches free air) shall not be utilized as low-venting. In slate or clay tile roof applications, a combination of gable-end and soffit vents shall be used when possible.

All ventilators shall be installed in accordance with manufacturer's recommendations. As an example:

- Holes shall be cut to provide a free opening at least equal in size to the opening in the ventilator.
- There shall be no obstructions in the line of the vent opening. Be sure to cut and place ventilators so as to avoid rafters and other structural components.
- Low ventilators shall be placed a minimum of one foot above the level insulation will be blown.
- Soffit vents and other low vents, which would cause blowing of loose fill insulation, shall be provided with adequate baffling so as to deflect air above the surface of the attic insulation and to prevent blockage of the vents (or blanket insulation may be stapled in these areas allowing for sufficient clearances).
- All necessary precautions shall be taken to ensure a watertight installation.
- Roofing shall overlap roof "cans" at the top in all cases and sides, when possible.

## 2700 DUCT/PIPE INSULATION & DUCT/SEAL REPAIR/REPLACEMENT

All ducts and pipes (excluding drain pipes) located in unheated or areas which are being insulated and ventilated (e.g., attics and crawl spaces) shall be insulated.

### 2701 INSULATION LEVEL:

When called for, install a minimum R-3 flexible or rigid type insulation on all ducts exposed to unheated areas, and a minimum R-3.5 pipe insulation on all water and heat pipes exposed to unheated areas.

Various type duct and pipe insulations are acceptable based on compliance with DOE/WAP Appendix A (see Section 4400, Minimum Standards for Wx Materials) and commercial availability.

Notes: The maximum flame spread classification for duct and pipe insulation is 150. Insulation for ducts subject to routine human contact shall be classified Type 2 or 3, Class A material, and have a facing with a flame spread rating of 50 or less. All materials used in conjunction with pipe insulation must be capable of continuous operation at 180°F and have a smoke density rating of 50 or less.

### 2702 PRECAUTIONS AND PREPARATION REQUIREMENTS:

All ducts and pipes shall be thoroughly inspected for leakage and proper support. Leaking ducts and pipes shall not be insulated with proper documentation on eBCJO. Additional support straps shall be provided for ducts and pipes as necessary.

### 2703 DUCT SEALING/REPAIR/REPLACEMENT:

Seal, repair and/or replace all heat and return air ducts as necessary to insure the integrity of the supply and return systems.

Where possible, problems related to the fit of ductwork shall be corrected regardless of location of ductwork (both in heated and unheated areas). Problems with ducts including the repair of the furnace blower compartment if required may be corrected using sheet metal screws, a high quality foil tape, sheet metal, a duct sealant, or foam. Typical problems include ducts disconnected at joints, holes in ducts, seams in ducts open and bent ducts.

#### 2704 FURNACE FILTERS:

Dirty or non-existent furnace filters may be replaced as a part of this measure with a properly sized commercially available filter. Clients shall be instructed in proper intervals for replacement of the filters as a part of the Client Education portion of Michigan's Weatherization Assistance Program.

#### 2705 SEALING BLOWER COMPARTMENT:

Ensure that the blower compartment is sealed (e.g., openings sealed, properly fitting door, a filter rack cover is in place, etc.).

#### 2706 DUCT SIZING:

New duct work shall be sized in accordance with the State Mechanical code.

<h3>2800 FOUNDATION INSULATION</h3>
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#### 2801 BAND JOIST (SILL BOX) INSULATION:

When called for by the NEAT audit or the measures priorities, all band joist pockets located between heated and unheated areas shall be insulated.

#### 2802 INSULATION LEVEL/REQUIREMENTS:

When called for, batt or blanket insulation shall be installed in the band joist pockets between heated and unheated areas; R-value will be determined by the depth of the pocket from the band joist to the face of the foundation wall (up to a maximum R-19). Insulation shall meet the requirements of the governing code and the flame spread classification shall not exceed 150.

#### 2803 INSULATION APPLICATION:

Band joist insulation shall be provided for all band joist pockets between heated and unheated areas when required. Batt or blanket insulation shall be cut slightly oversized for each band joist pocket, so that when installed it will form a snug fit (be in contact with floor joist on both sides, sub-floor at the top, and sill plate/foundation wall at the bottom) without compression. Insulation shall be placed in contact with the band joist.

Prior to insulation, all by-passes in the band joist/sill plate area shall be air-sealed in accordance with the requirements of section 3100 Infiltration/Exfiltration/Major Bypass Measures.

#### 2804 FLOOR INSULATION:

When called for by the NEAT audit or the Measures Priorities, floors between heated and unheated areas shall be insulated.

#### 2805 INSULATION LEVEL:

Install insulation in floor joist cavities at the level determined by the NEAT audit whenever floor insulation is called for.

Homes weatherized in accordance with the priorities system for standard wood frame construction shall be insulated to an R-11 level.

### 2806 FLOOR INSULATION APPLICATION:

Floor insulation shall be installed, when practical, over unheated crawl spaces or unheated basements (between all heated rooms and unheated foundation areas).

### 2807 FOUNDATION/PERIMETER INSULATION:

When called for by the NEAT audit or the Measures Priorities, all foundation walls between heated and unheated areas shall be insulated.

### 2808 INSULATION LEVEL:

Install a minimum R-10 insulation on foundation perimeter walls whenever foundation (perimeter) insulation is called for.

### 2809 PERIMETER INSULATION APPLICATION:

Perimeter insulation shall be installed when practical (in areas where floor insulation is not being utilized) along foundation walls to separate heated from unheated areas. Insulation used shall be appropriate for the application and installed in accordance with requirements of the governing code and the manufacturer's recommendations.

Heated foundation areas (basements and crawl spaces) shall be provided with perimeter insulation where possible. Perimeter insulation can also be utilized as an alternative to floor insulation in situations in which floor insulation is not practical, including the following:

1. Furnace located below the floor level and within the foundation area.
2. Extensive duct work located below the floor joists.
3. Plumbing located below the floor joists (which may be susceptible to freezing).
4. Client usage of below floor areas which requires heat.
5. Pumps, water heaters, or other equipment located below the floor level (which may be susceptible to freezing).
6. Situations where portions of the floor are not accessible to do floor insulation (but the Perimeter is accessible).

Install a batt, blanket, or rigid board insulation on either side of foundation walls extending the full height from the foundation floor or footing to the bottom of the sub flooring or first row of siding. If the footing or foundation floor is not below the frost line, the insulation must be installed to extend two feet horizontally from the foundation wall at the bottom. Insulation shall be installed to fit snugly together and flush where pieces meet, and shall be tight to surfaces at the top and bottom, fastened, and protected in accordance with the manufacturer's instructions for the type of insulation utilized. If a vapor barrier exists, it shall be installed on the warm (heated) side of the foundation. Insulation shall be kept a safe distance from heat sources.

Prior to insulation, all by-passes between heated foundation areas and unheated areas shall be air sealed (e.g., foundation wall penetrations, cores of block opening into heated areas, gaps at sill plate).

Refer to Section 3100 Infiltration/Exfiltration/Major Bypass Measures.

### 2810 GROUND COVER:

When floor or perimeter insulation is required, and a dirt floors exists, the dirt floor shall be covered with a minimum six mil polyethylene film held in place with rocks, boards, earth, or sand. If it is necessary to use more than one piece, overlap joints; be sure to have at least a 12-inch overlap, weighted down. Ground cover shall also extend up foundation walls approximately six inches and shall be weighted down around the outside perimeter.

## 2900 FOUNDATION VENTILATION

Whenever floor insulation is provided, adequate ventilation must be included to ensure the effectiveness of the insulation and guard against deterioration caused by moisture accumulation. In the case of perimeter insulation, ventilation is optional; the need for ventilation would be determined by moisture conditions in the foundation area.

### 2901 VENTILATION REQUIREMENT (FORMULA) - FLOOR INSULATION:

All unheated foundation areas below floor insulation shall be provided with ventilation to a minimum net free ventilation area of one square foot per 1500 square feet of floor area (Rule of thumb — 1 square inch of vent / 10 square feet of floor).

### 2902 VENTILATION OPTIONAL - PERIMETER INSULATION:

Ventilation would not normally be used when the foundation perimeter is being insulated. Do not cover existing vent openings, but ensure that there is a means of closing the openings during the heating season. Inoperative vents shall be replaced with operable vents. New operative vents may be installed in areas which may be subject to moisture problems during the non-heating months. In cases where ventilation exists or is added to heated foundation areas, the client shall be instructed to close the vents during the heating season.

### 2903 VENT PLACEMENT STANDARDS AND REQUIREMENTS:

When ventilation is being added, it shall be placed so as to eliminate still air pockets in the foundation areas being addressed. This can be accomplished by providing separate vents to isolated areas and placing vents to allow for cross-ventilation, whenever possible. Vents for areas to be completed with perimeter insulation must be closeable. All ventilators shall be installed in accordance with the manufacturer's recommendations. Vent openings must be a minimum of 1/8" and may not exceed 1/4". Vents shall be installed clear of obstructions.

## 3000 FURNACE/BOILER/SPACE HEATER REPLACEMENT

Program funds may be used to replace unsafe heating systems in owner occupied units only. The NEAT Audit and/or complete Manual "J" shall be used for sizing purposes.

### 3001 INSTALLATION:

Installation must be completed by a licensed mechanical contractor. Installation shall be in accordance with the requirements of the governing code and manufacturer's recommendations and a mechanical permit shall be obtained from the responsible code enforcement authority.

Installation shall include all necessary related work as required (e.g., thermostat, combustion air intake, and exhaust ventilation of existing appliances). New heating appliances (including water heaters) which are to be installed on a concrete, dirt, or damp floor, shall be raised a minimum of 1" above the floor surface. New forced air heating systems shall have a filter rack with a cover, installed in the return air plenum, in an accessible location.

### 3002 SPACE HEATERS:

Compliance with the DOE Space Heater Policy contained in this Section/Subject is required. Un-vented space heaters **must** be replaced with vented space heaters prior to any weatherization activities. Agencies have flexibility in determining fuel type for new space heaters and shall consider costs/savings in making this determination. The purchase/installation of un-vented space heaters is prohibited.



### 3003 DUCT SIZING:

New duct work shall be sized in accordance with the State Mechanical code.

### 3004 DOCUMENTATION REQUIREMENTS:

The "All Combustion Appliances" and "Primary Heat Source" sections of the electronic Building Check and Job Order Sheet shall be completed by the Mechanical Contractor when furnace work is required. It is required that the mechanical permit number be stated on the eBCJO or a copy of the permit attached.

### 3005 CERTIFICATION:

Once the unit has been installed, the mechanical contractor must place identification on the appliance in plain view, certifying that the system has been properly installed in accordance with governing code requirements. The identification shall indicate the date of installation and the name and phone number of the mechanical contractor.

The mechanical permit number shall be stated on the eBCJO and/or a copy of the permit attached on new installations. All installations are subject to jurisdiction verification.

<h3><u>3100 INFILTRATION/EXFILTRATION/MAJOR BYPASS</u></h3>
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Infiltration/Exfiltration/Major Bypass shall be addressed to the extent dictated by blower door testing.

### 3101 BLOWER DOOR TESTING:

Blower door testing shall be utilized to identify leakage sites and determine the infiltration/exfiltration/major bypass work needs/extent (see Section 3100 and 4000 Blower Door Test Requirements).

The infiltration/exfiltration/major bypass measures will be considered fulfilled if (1) blower door calculations are completed to show the dwelling is at the minimum air change level for occupant safety conditions, or (2) the initial air change level is reduced by an appropriate percentage. See guidelines in Section 4000, Blower Door Testing.

### 3102 MAJOR BYPASSES:

Major bypasses are defined as openings/direct penetrations between heated and unheated areas of 1/2 inch or greater. Major bypasses are considered mandatory weatherization measures and shall be addressed.

### 3103 INFILTRATION/EXFILTRATION:

Infiltration/exfiltration is defined as openings/direct penetrations between heated and unheated areas of less than 1/2 inch.

### 3104 AIR CONDITIONER INFILTRATION MEASURES:

Permanently set air conditioners shall be closed off with an air conditioner jacket in heating seasons. Air conditioner jackets shall be provided to the client in non-heating seasons. Jackets shall be sized to fit air conditioner units.

### 3105 CLOSING OFF FIREPLACES:

Unused fireplaces with no damper or a poorly fitting damper and no other existing means of sealing shall be closed off to stop infiltration/exfiltration/major bypass.

- Blocking shall not be of a permanent nature (shall be removable).
- Blocking shall be flagged
- Documented on the eBCJO and with client's signature in file (e.g., red tagged, noting blocking).

Fireplaces which are used and cannot be effectively closed off by the damper, fireplace doors or other means, shall be repaired or otherwise corrected to allow closure when not in use.

### 3106 CLOSING OFF AREAS:

Portions of homes not necessary for client use, which would require heat, shall be closed off to the maximum extent possible (as is acceptable to the client/owner). New interior doors may be installed where none exist in order to separate heated from unheated areas. Interior walls between heated and unheated areas shall be insulated in accordance with section 3400.

Unused, unheated second and third floor areas may be closed off by insulating floor-ceiling areas between heated and unheated floors. In such cases, appropriate attic preparation and ventilation is required.

### 3107 ACCESS OPENINGS BETWEEN HEATED AND UNHEATED AREAS:

New covers: shall be of an A-D type interior plywood, minimum ½ inch thick or structural equivalent. Cover shall be lay-in type. Rough opening (minimum size of 14½ x 24 with proper framing methods meeting local codes) shall be enclosed to totally support finish trim and cover. Finish trim shall be similar to door casing with mitered corners.

Ceiling Access: All ceiling access doors to attic areas must be weather-stripped and insulated to the level of applied insulation in the attic area.

Knee wall Access: All knee wall access doors between heated and unheated areas must be insulated (minimum R-11) and weather-stripped. If an access door is to be installed, it shall be A-D interior type plywood (minimum ½ inch thick). The door opening shall be framed and cover hinged with a barrel bolt or otherwise attached so as to be easily removable for access/inspection, without special tools, and prevent warping.

Barriers: Permanent barriers are required to allow for full depth of insulation to be applied around such openings. Attic areas not used for storage or accessed by occupants may use fiberglass batts extending a minimum of 15 inches on all sides of the access and 2 inches above the level of applied insulation. No gaps shall exist in a barrier so fashioned.

Walk-Up Stairs: Where attic areas are not being used to any extent (with the client/owner approval), covers can be provided to cap the stairwell opening. Covers shall be cut from minimum ½ inch plywood and shall be hinged, weather-stripped, and insulated to a minimum R-19 with batt or blanket insulation. Where simple access is necessary (e.g., elderly client or high-use area), the stairwell door shall be weather-stripped and insulated to an R-11 minimum. Insulation shall be applied between heated and unheated areas (walls of stairwell adjoining heated rooms and under the stairs, if appropriate/possible).  
Floor Access: All floor access doors from heated areas to unheated foundation areas shall be weather-stripped and insulated to the level determined by the NEAT audit for floor insulation.

Foundation Wall Access/Openings: Access doors between heated foundation areas and unheated areas shall be fully weather-stripped and insulated to the level of applied insulation in the foundation area. Where openings exist between heated foundation areas and unheated areas, they shall be closed off/

sealed by appropriate means (e.g., repairs such as masonry or framing, or construction of access doors of minimum 1/2 inch plywood).

### 3108 SEALING NEW WOOD/WEATHERIZATION MATERIALS:

Wood and similar materials requiring a sealer shall be so protected whenever moisture may affect these materials. This includes all new wood doors and sash even when they may be protected by a storm window/door.

### 3109 DECAY RESISTANT WOOD REQUIREMENTS:

Code requirements for use of pressure treated or other approved decay-resistant wood shall be complied with. Generally any wood within 8" of exposed earth must be pressure treated or otherwise approved for use.

## **3200 HEALTH AND SAFETY (MANDATORY) MEASURES**

### 3201 SMOKE DETECTOR:

Smoke detectors are required as a health and safety measure. Smoke detectors shall be battery powered, installed in accordance with the manufacturer's recommendations, following state and local code requirements. New batteries may be installed in existing working smoke detectors. (Alkaline are recommended) Client education on appropriate test procedures and intervals to replace the batteries shall be documented.

### 3202 CLOTHES DRYER VENTING:

Clothes dryers shall be vented directly to the exterior (where possible). (see Section 4001) Clothes dryers shall be vented using aluminum or galvanized sheet metal, or a test lab labeled aluminum flex duct (UL labeled "Clothes Dryer Transition Duct", maximum distance of eight feet).

## **3300 STORM WINDOWS**

When called for by the NEAT/MHEA audit, storm windows shall be installed over existing single-glazed prime windows. Storm windows shall be compatible with the operation of prime windows (e.g., double-hung storms for double hung prime windows.) Storm windows must meet the applicable building code requirements relative to egress and shall not restrict open area of bedroom egress window. Operative prime windows shall remain operable without removal of storm window frame.

## **3400 WALL INSULATION**

When called for by the NEAT/MHEA audit or the Measures Priorities, walls between heated and unheated areas shall be insulated.

### 3401 INSULATION LEVELS:

Enclosed wall cavities shall be blown to a high density. Open wall cavities shall be insulated to a minimum R-11. Insulation left exposed to the interior shall have a flame spread classification not to exceed 150. Insulating over knob and tube wiring is prohibited in some areas by code. See Section 3900, Wiring. Any evidence of problems with wiring in the wall cavities to be blown shall be inspected and corrected by a licensed electrician or otherwise insulation shall not be installed and the file properly documented.

## 3500 ELECTRIC BASE LOAD MEASURES STANDARDS AND SPECIFICATIONS

Standards and specifications pertaining to Electric Base Load Measures are contained in this section.

### 3501 COMPACT FLUORESCENT LIGHT BULBS:

When called for by the NEAT/MHEA audit or the measures priorities incandescent bulbs shall be replaced with compact fluorescent light bulbs (CFL).

An inspection shall be conducted to determine the retrofit of incandescent light bulbs with CFLs. The replacement CFL wattage would be determined by the usage and suitability for the client.

When the audit is performed using Measures Priority, lights used 3 or more hours per day (up to eight (8) bulbs per household) shall be replaced. All bulbs identified by a complete NEAT/MHEA assessment with an SIR=>1.5 shall be replaced.

### 3502 REFRIGERATORS:

In owner occupied units an audit shall be conducted of the existing refrigerator(s). If the Savings to Investment Ratio (SIR) is 1.5 or greater, the existing refrigerator(s) may be replaced at the time of weatherization with a single refrigerator that meets or exceeds the 2001 federal energy standards. Refrigerators may not be installed where none exist.

The replacement of only one refrigerator is allowed. Households which utilize more than one refrigerator and/or freezer shall be encouraged to eliminate additional units. Costs of disposal/recycling all units are allowable. If the appliance(s) identified for replacement are not available/present at the time of delivery the new refrigerator shall not be delivered. This shall be documented on the eBCJO and the refrigerator replacement shall be eliminated as a Wx measure for this dwelling unit.

- The audit can be a NEAT/MHEA (version 7.4.3 or newer) evaluation, the "Refrigerator Energy Data and Analysis Tool" (developed by D&R International, LTD), or by entering metered data into the eBCJO
- A minimum of 10% of the units evaluated will be subject to live metering to determine actual watt-hour consumption.
- Refrigerators assessed using data base evaluation must match the model number.
- Any refrigerator newer than 1993 must be metered as they are not listed in the data base.
- The minimum duration for metering is two (2) hours (120 minutes).

If it is determined that a defrost cycle has occurred during the metering interval, one of the following will be required:

- The metering interval shall be extended to 24 hours.
- The data shall be discarded, the meter reset and the two (2) hour interval begun again.

### 3503 HEALTH AND SAFETY REFRIGERATOR REPLACEMENT:

Malfunctioning refrigerators shall be replaced for the following documented reasons:

- Inoperable.
- Continuously running compressor.
- Unable to maintain safe food storage temperature (temperatures of refrigerator (34-40 degrees F) and freezer (0 to +/-5 degrees F) compartment will be checked during the inspection).

### 3504 DISPOSAL REQUIREMENTS:

Disposal requirements will include, removing the existing appliance(s) identified for replacement from the client's home and certified destruction (including recapture of CFC's as required by section 608 of the "Clean Air Act", as amended by Final Rule, 40 CFR 82, May 14, 1993).

A Certificate of Disposal from the scrap yard/recycler shall be available for all appliances removed from service and a copy placed in the client/job file.

### 3600 DOMESTIC HOT WATER TANK (DHW)

Inspection of water heaters shall be completed in compliance with Section 3900. New water heaters may be installed in owner occupied units when called for as a HEALTH AND SAFETY measure or based on SIR as determined by the Water Heater Analysis Spreadsheet or NEAT/MHEA. Agencies may change fuel type if it is determined as merited based on cost/savings considerations (costs included in SIR). Funds cannot be used to convert to an electric water heater from another fuel source. Water heaters shall be installed by a State Of Michigan licensed contractor in accordance with the requirements of the governing code. The permit (where required) shall be obtained from the responsible code enforcement authority with copy or documentation maintained in the client file. Once the unit has been installed, the contractor must place the information on the appliance, in plain view, certifying that the system has been properly installed in accordance with governing code requirements. The information shall indicate the date of installation and the name and phone number of the mechanical contractor.

### 3700 OPTIONAL WEATHERIZATION MEASURES, STANDARDS AND SPECIFICATIONS

Standards and specifications pertaining to Optional Weatherization Measures are contained in this section.

#### 3701 LOW FLOW SHOWER HEAD:

All existing shower heads shall be examined for flow rate. Shower heads exceeding maximum two-and one-half gallons per minute at normal residential water pressures (20-40 psi) may be replaced with low flow shower heads. Head must be able to withstand temperatures of 160 degrees F.

#### 3702 DHW TANK INSULATION:

Water heaters shall be thoroughly inspected to determine whether they shall be insulated using the following guidelines:

1. Tanks which leak or have leaking pipes shall not be insulated.
2. If manufacturer's directions/warning labels indicate insulation is not recommended, tank shall not be insulated.
3. An operable temperature/pressure relief valve must be mounted to the tank (within the top 6") with the discharge directed downward and terminating within 6" of floor. If not the tank shall not be insulated.
4. Combustion type water heaters must have their own exhaust vent directly to the chimney or outside properly installed with a minimum 1/4 inch/foot positive pitch; if not, the tank shall not be insulated.
5. Combustion type water heaters must have a cover plate attached, covering the burner opening; if not, the tank shall not be insulated.
6. Combustion type water heaters with a vent damper shall not be insulated.

### 3703 CLOCK SETBACK (SMART) THERMOSTAT:

Clock thermostats shall only be installed in homes where clients have agreed to utilize the set-back for a reduced temperature a portion of the day.

Thermostat shall be clock-operated type designed to provide a minimum of one setback period per 24 hours. Thermostat shall be compatible with existing furnace system. All thermostats installed shall display current room temperature.

In cases where installation of a new thermostat is not possible, (e.g., poor condition of wiring, incompatibility with the existing heating system) this item shall be not be attempted.

### 3704 INSTRUCTIONS TO CLIENT:

Clients shall be instructed on the setting and operation of new clock thermostats and the replacement of batteries for thermostats utilizing batteries.

### 3705 FURNACE/BOILER/SPACE HEATER TUNE-UP/REPAIR:

Furnace, boiler, and space heater tune-up and repairs shall be conducted by licensed mechanical contractors.

- A tune-up involves a visual inspection, testing procedures, cleaning, and adjustments to improve the combustion and seasonal efficiency of the heating system.
- Repairs involve the replacement or reconstruction of defective or unsafe parts for the purpose of ensuring the safe operation of the heating system.

The contractor must place information on the appliance, in plain view, certifying that the system has been properly serviced in accordance with governing code requirements. This information shall indicate the date of service and the name and phone number of the licensed contractor.

## 3800 HEALTH AND SAFETY

Health and safety policies, procedures, requirements and measures are contained in this section.

### 3801 HEALTH AND SAFETY POLICY:

The health and safety of clients, local weatherization operator (LWO) staff, and contractors is of primary concern. Health and safety hazards specifically not to be abated under the Michigan Weatherization Program shall include hazards presented by asbestos, radon, lead, mold and moisture, or toxic chemicals. Weatherization funds may be used for the elimination of energy related health and safety hazards that are necessary before or because of the installation of weatherization materials.

### 3802 HEALTH AND SAFETY PROCEDURE:

Each home weatherized by an LWO must be assessed to detect the existence of potential hazards to workers or clients. **If unsafe conditions exist that would endanger the health and safety of the clients or weatherization workers, and those conditions can not be corrected, no weatherization work may be started on that home.**

The pre-inspection shall include, but is not limited to, a health and safety inspection and discussion with the client relative to the following:

- Blower Door testing consistent with Section 4000.
- An inspection of all combustion appliances for safety factors (see Section 4000).
- Furnace testing for safe operation (see Section 4000).

- Carbon Monoxide testing of all combustion appliances in accordance with Section 4000.
- Evaluation of the venting system, including back draft testing, of all vented appliances.
- Evaluation of the duct system (e.g., return air properly ducted and air-tight).
- A complete evaluation of existing and potential moisture problems.
- A review for the existence of any one of a number of hazardous substances (asbestos, lead paint, volatile organic compounds) that may be in the home.
- A review of the need for smoke detectors.
- Checking clothes dryers for proper venting.
- A review for structural safety.
- A review for means of egress.
- A review for electrical hazards.
- A review for fire hazards.
- An eBCJO completed with respect to the above health and safety issues.

To ensure that the weatherization work that was completed does not create potential problems, the post-inspection shall include, but is not limited to, a health and safety inspection and discussion with the client relative to the following:

- A final blower door test after all work has been completed. This test must be consistent with Section 4000 to ensure that building tightness recommendations have not been exceeded.
- An inspection of all combustion appliances for safety factors (See Section 4000).
- Furnace testing for safe operation (Section 4000).
- Carbon monoxide testing of all combustion appliances in accordance with Section 4000.
- Evaluation of the venting system of all combustion appliances, including testing for spillage and back drafting.
- An evaluation of the moisture conditions in the home and the attic.
- A review of all weatherization work completed with respect to health and safety (e.g., structural damage as a result of weatherization work).

If the post-inspection indicates that weatherization work resulted in a health and safety problem, the agency must correct the problem prior to submitting the unit as a completion.

### **3803 REQUIRED DOCUMENTATION:**

An eBCJO shall be completed which will include health and safety factors.

## **3900 HEALTH AND SAFETY ASSESSMENT REQUIREMENTS**

Health and safety assessment requirements are contained in this section.

### **3901 ASBESTOS - DESCRIPTION:**

A fibrous, non-combustible mineral.

### **3902 HEALTH/SAFETY CONCERNS:**

Asbestos fibers are microscopic. When disturbed and released into the air, the fibers can be inhaled. Significant exposure may result in lung cancer, asbestosis, or Mesothelioma. Known asbestos containing building components shall not be handled during the course of weatherization work in a way which would cause the transmission of asbestos dust into the air.

Friable asbestos is any asbestos containing product which can be crumbled, pulverized, or reduced to powder by hand pressure friable asbestos shall not be touched. If suspected friable asbestos is found in a home, written notification shall be provided to the client/owner. Notice of Asbestos (DHS-4290) is located in the forms section at the end of this manual. A copy of the written notification shall be maintained in the client file.

- Weatherization work is not required in areas where asbestos may be disturbed.
- If a weatherization measure is deleted due to the presence of asbestos, proper documentation shall be provided on the electronic Building Check and Job Order Sheet.
- This decision would normally be made by the pre-inspector.
- If the contractor or crew determines the presence of asbestos which would effect their ability to complete a prescribed weatherization measure in a safe manner without creating/disturbing asbestos dust, they shall notify the LWO and the measure shall be deleted (again, proper documentation shall be provided on the electronic Building Check and Job Order Sheet).
- Contractors and crews shall not be penalized for refusing to work on asbestos-sided homes.

Removal of asbestos requires workers and a supervisor who have attended asbestos training as specified in the MIOSHA Asbestos Standards for Construction (29 CFR 1926.1101) and shall adhere to the work practices and training set forth in that document, and other state and federal regulations concerning asbestos. State regulations on asbestos are administered by the Michigan Department of Consumer and Industry Services, Division of Occupational Health, Asbestos Program, 7150 Harris Drive, Lansing, Michigan 48909. Phone: (517) 312-1310.

### 3903 CARBON MONOXIDE (CO) – DESCRIPTION:

An odorless/colorless gas produced as a byproduct of an incomplete combustion process.

### 3904 HEALTH AND SAFETY CONCERNS:

It is a direct and cumulative poison. When combined with blood hemoglobin, CO replaces oxygen in the blood until it completely overcomes the body. Low level CO poisoning symptoms include headaches, confusion, dizziness, nausea, vomiting, convulsions, sleepiness, stinging eyes, and loss of muscular control. Death from CO poisoning occurs suddenly. A victim inhaling a toxic concentration of the gas may become helpless before realizing that danger exists. Effects can vary significantly based on age, sex, weight, and overall state of health. Children, the elderly and the infirm may be seriously affected by even low levels of CO depending on the concentration and exposure period.

### 3905 CARBON MONOXIDE TESTING:

Carbon monoxide testing is required (see Section 4000).

### 3906 CLIENT NOTIFICATION:

Potential CO related health and safety concerns shall be discussed with the client. Client shall be immediately advised of any serious concerns relative to CO. If CO testing indicates a CO problem a Notice of Indoor Air Quality Concern, DHS-4289 shall be provided.

### 3907 CARBON MONOXIDE DETECTOR INSTALLATION:

Carbon monoxide alarms may be installed whenever a local agency must defer work on a dwelling under the following circumstances:

- The dwelling unit contains an unsafe combustion appliance
- A combustion appliance is putting off unsafe levels of CO that can not be immediately remedied
- A combustion appliance has minimal draft and/or spillage and CO is being produced
- The dwelling contains a fireplace or wood burning stove that draws combustion air from inside the dwelling



Replacement/removal of unsafe combustion appliances in rental units is the responsibility of the landlord/property owner/tenant.

**WEATHERIZATION WORK WILL NOT BE DONE UNTIL UNSAFE APPLIANCES HAVE BEEN REPAIRED, REPLACED, OR REMOVED.**

**3908 INDOOR AIR QUALITY:**

Pre-inspection procedures shall include a visual review and discussion with the client relative to potential indoor air quality (IAQ) problems, such as:

- Combustion by-products/carbon monoxide
- Unstable lead-based paint
- Friable asbestos

If IAQ problems are found, the client shall be advised and written notification shall be provided to the client, landlord, owner, and/or his/her agent. A copy of the written notice shall be maintained in the client file. Notice of Indoor Air Quality (DHS-4289) is located in the forms section at the end of this manual.

Where possible, "incidental repairs" or "health and safety" measures may be completed to correct IAQ problems in order to allow weatherization work to take place. Client education shall be provided where appropriate

In addition to asbestos, carbon monoxide, and lead based paint which are addressed in this section, other IAQ concerns may include:

- Volatile Organic Compounds (VOC): Cleaning fluids, paints, solvents, herbicides, pesticides, and formaldehyde. Known to be potential irritants to lungs, eyes, and skin. Some VOCs may be carcinogenic. VOCs are frequently stored under sinks, in closets, and basements. Formaldehyde may be found in a variety of building components including plywood, carpeting, and particle boards. Recommend moving potentially dangerous material outside of living space into sheds or garages. Basements are not recommended for storage, particularly if leaky ductwork exists.
- Airborne Particulate Matter: Primarily tobacco smoke or smoke from improperly vented wood stoves. It is known to cause lung cancer. Excessive air-tightening can increase levels of carcinogenic by-products in homes. Homes with high levels of tobacco smoke or other indoor pollutants shall not be over tightened (see Section 4000 Blower Door Testing).
- Fiberglass: Fibrous glass insulation material. Known to be an irritant to lungs, eyes and skin. Most preliminary research indicates no long-term negative health effects resulting from exposure to high levels of fiberglass, but some studies have indicated that some types of finely chopped blown-in fiberglass may be a potential carcinogen. Exposed fiberglass shall not be left in occupied areas of homes. Workers are advised to wear properly rated respirators and protective clothing when working with or around fiberglass.
- Raw Sewage/Methane Gas: Workers must take precautions to avoid direct contact with raw sewage or other unsanitary conditions. Clients must be informed of existing conditions and referred to available resources for assistance.

Further information on indoor air quality is available from the U.S. Consumer Product Safety Commission. It may be contacted by calling (800) 638-2772 or writing U.S. Consumer Product Safety Commission, Washington, D.C. 20207.

### 3909 MOLD AND MOISTURE ASSESSMENT:

Molds, mildew and spores are primarily caused by excessive moisture levels in a home. These substances can be a significant contributing factor in a number of health problems. Excessive moisture in a home provides an environment that allows mold and mildew to flourish. Homes with serious moisture problems shall not be tightened until measures are taken to mitigate the moisture sources.

All homes shall be checked for previous or existing moisture problems. Pre-inspection procedures shall include a mold and moisture assessment. The assessment shall be a visual review that includes these four categories:

- General building envelope
- Outside/Site
- HVAC
- Occupied space

The following pages contain:

- A sample Wx Building Mold & Moisture Assessment Checklist that can be used to conduct the assessment
- A Client Tips to remedy Mold/Moisture problems sheet
- Weatherization Mold Assessment and Release Form (DHS-552) to be used to notify the client of Mold/moisture problems
- A copy of the Weatherization Mold Assessment and Release form (DHS-552) shall be maintained in the client/job file.

The mold and moisture assessment shall be done to assure existing mold conditions are noted, documented and disclosed to the client, and to assure that existing building envelope conditions do not contribute to mold growth when weatherization measures are applied.

Documentation of current situation:

- Use the Assessment Checklist
- Take photos or video
- Record in client file

Disclose what you know and don't know:

- Don't claim Mold Expertise
- Share checklist results of observed situation
- Share photos of findings
- Stress "no testing was done to verify findings"
- Provide EPA mold publication
- Obtain client signature of disclosure on Mold Assessment and Release form (DHS-552B)

## **WEATHERIZATION PROGRAM**

### **MOLD & MOISTURE- Wx BUILDING ASSESSMENT CHECKLIST**

#### **Building Assessment:**

- Examine structure, maintenance activities, and occupancy patterns
- Look for mold and water staining
- Look for evidence of standing water
- Look for evidence of condensation
- Check basement or crawl space and attic for proper venting and exhaust

#### **Outdoors/Site Assessment:**

- Soil grade or drainage toward foundation
- Standing water adjacent to foundation
- Wall and roof damage allowing water intrusion
- Missing or blocked rain gutters
- No downspout extensions
- Firewood stacked adjacent to house
- Excessive shrubbery around foundation

#### **HVAC System Assessment:**

- Air intakes: debris (organic) vs. clean air
- Filters: dirty, damp, poor type
- Heat exchangers: dirty & damp coils, condensate pans, drainage, stagnant water
- Ducts: contamination, moisture

#### **Occupied Space Assessment:**

- Plumbing leaks
- Water stains on walls, ceilings and around windows
- Musty odor
- Surface Condensation (especially during mild weather)
- Mold on Carpeting
- Humidifiers
- Window Air Conditioners
- Lack of bathroom, kitchen exhaust
- Clothes dryer not vented to outside
- Firewood stored indoors
- Wet clothes drying indoors

## **Client Tips to remedy Mold/Moisture Problems**

- ❖ Clean, disinfect, and dry surfaces
- ❖ Lower humidity levels
- ❖ Clean and disinfect humidifiers, dehumidifiers, refrigerator pans and air conditioning coils
- ❖ Exhaust the dryer to the outdoors
- ❖ Run a bathroom exhaust fan during bathing or showering
- ❖ Use a range-hood to exhaust cooking moisture
- ❖ Fix plumbing leaks and seepage
- ❖ Raise temperature of cold surfaces with insulation or storm windows
- ❖ Increase air circulation by opening closet doors and moving furniture away from walls

For more information you may obtain "A Brief Guide to Mold, Moisture, and Your Home" at:

**<http://www.epa.gov/iaq/molds/moldguide.html>**

# MICHIGAN WEATHERIZATION PROGRAM HEALTH & SAFETY ASSESSMENT FINDINGS

Department of Human Services

AGENCY NAME  

Client Name <span style="background-color: #cccccc; padding: 0 40px;"> </span>		Job Number <span style="background-color: #cccccc; padding: 0 20px;"> </span>
Address <span style="background-color: #cccccc; padding: 0 40px;"> </span>	City, Zip <span style="background-color: #cccccc; padding: 0 40px;"> </span>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>

## 1. Moisture Areas – Existing conditions (check all that apply)

- ☐ Actual construction defect or deterioration that allows water into the home (roof, decks, windows, concrete slabs, moisture infiltration)
- ☐ Evidence of conditions that might allow water in the home (poor grading, bad flashing, bad/missing gutters)
- ☐ Any other source of water vapor or moisture; signs of condensation
- ☐ Plumbing defects (leaking drains, pipes or toilet seals, missing caulk on sinks or tubs)
- ☐ Damp atmosphere in house
- ☐ Evidence of water penetrating the home (stains, moist areas)
- ☐ Visible mold growth (if "Yes," complete #2)
- ☐ HVAC problems (dirty, moist filters, poor condensation drainage, plugged or disconnected vents)
- ☐ Dryer vented indoors, inadequate ventilation for kitchen, bath or other high moisture area
- ☐ Other (planters, aquariums, hot tubs, nearby swamps, etc.) List all that apply
- ☐ Client complaint of allergy-like symptoms

## 2. Mold Areas – Existing conditions (check all that apply)

Checklist	Mold/Musty Odors	Existing Mold	Sq. Ft. of Mold Area	No Evidence of Excessive Mold Found
<input type="checkbox"/> Bath (location): <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Shower (location): <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Kitchen	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Laundry Area	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Basement Walls	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Crawlspace	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Exterior Walls	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Attic	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Ceilings	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>
<input type="checkbox"/> Other (specify) <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/>

Moisture/Mold Disclaimer: By signing below, I acknowledge that I have received the above information concerning moisture and mold conditions in my home prior to any weatherization work being done and I will take steps to reduce excessive moisture by utilizing one or more of the tips in the attached Client Tips fact sheet. I also understand that the agency may choose to defer work on my dwelling until the referenced area(s) have been remedied. If the agency proceeds with weatherization work, I agree to hold the agency, and its contractors, performing weatherization harmless for any future moisture or mold problems that are not directly attributable to weatherization work.

Weatherization client signature <span style="background-color: #cccccc; padding: 0 40px;"> </span>	Date <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>
Agency Representative <span style="background-color: #cccccc; padding: 0 40px;"> </span>	Date <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<span style="background-color: #cccccc; padding: 0 20px;"> </span>

Original – Agency File (always)  
Copy – Client (when applicable)

**RELEASE OF LIABILITY AND WAIVER OF CLAIMS**

Department of Human Services

AGENCY NAME **Health and Safety Assessment**

In addition to the energy audit we will do on your home, we will do a limited health and safety assessment of the home. The health and safety assessment will consist of a visual inspection for potential health and safety problems. You will be notified of any health and safety problems that are identified, including mold. However, the evaluator is not a qualified mold professional. Mold may be present in areas not accessible or seen during the visual inspection or during the actual work on your home. Work on your home will be performed in a manner to prevent future mold growth. Mold can be a problem in any home, but especially in those where there is an excessive amount of moisture or humidity present. In addition, if there are several people, pets, plants or fish aquariums present, conditions may exist for mold to grow. If there are existing conditions that are seen or unseen, we shall not be held responsible or liable. The agency and its contractors will be held harmless for any future moisture or mold problems that are not directly attributable to weatherization work.

**Weatherization Activities**

*Notice:* During weatherization activities, particularly when insulation is being blown into wall cavities and attics, insulation dust, other types of dust, and other particles may become airborne. Additionally, unforeseen circumstances may result in some insulation leaking through cracks into the home's living space. In those circumstances where insulation leaks into the living space, we will be responsible for clean-up (repairing damage and cleaning up the living area). Minor construction dust is inevitable at the end of any remodeling work. Construction dust clean-up will be the responsibility of the home owner/occupant.

*Recommendation:* It is recommended that people with the following health conditions be out of the house when insulation is being blown into the house: Asthma, emphysema, allergies and other respiratory conditions, pregnancy and any serious health conditions such as decrease immune functions which might be aggravated by dust and other dust-like particles in the air. Furthermore, it is also recommended that infants less than 12 months old should be out of the house when insulation is being blown. Persons who leave the house during the insulation process should remain outside the house for at least 30 minutes after completion of insulation activities.

**Release of Waiver of Claims:** I acknowledge by my signature below receipt of the information and recommendations set out above. Additionally, I agree on behalf of myself and any minor children or others for whom I am responsible, to hold the agency and its agents harmless from any claims, medical problems or personal injuries that may occur, develop or worsen in response to the weatherization activities. This waiver is for all damages, direct or indirect, that may relate to weatherization activities, including money lost by not being able to work, healthcare costs and pain or suffering.

**I am aware the weatherization process may cause airborne particles, including dust, to be released in my home and that such airborne particles can aggravate health conditions. I have chosen to go forward with the weatherization process, accepting any and all risks of injury or damages.**

**I have carefully read this release and waiver and fully understand its contents. I am aware this is a release of liability and have signed it of my own free will.**

Client Name		Phone		Job File Number	
<input type="text"/>		<input type="text"/>		<input type="text"/>	
Address		City/Zip			
<input type="text"/>		<input type="text"/>			
Client Signature		Date	Agency Witness		Date
<input type="text"/>		<input type="text"/>	<input type="text"/>		<input type="text"/>
Agency File (always) Copy - Client (always)					

### 3910 LEAD - DESCRIPTION:

A metal contained in paints and various other substances. Lead in paint was discontinued in 1978 for residential use.

### 3911 HEALTH/SAFETY CONCERNS:

Ingestion or absorption of lead into the blood stream is a serious health hazard causing brain damage over a period of time. This can be a particularly serious problem with small children, who may ingest paint chips or flakes or dust contaminated with lead products. Serious learning disabilities can result from excessive lead levels in the bloodstream. Workers can be contaminated in the same way as children, but are most likely to be exposed by breathing dust created by sanding or planing surfaces that contain lead based paints.

Lead paint is the primary source of lead in a home. Contamination occurs when lead paint is disturbed by sanding, chipping, or flaking.

### 3912 PROCEDURES:

Lead paint removal is not an allowable activity under the Weatherization Assistance Program. To minimize risks to clients and weatherization personnel:

- All weatherization contractors, crew persons, and pre/post-inspectors are to be trained and certified in "Lead Safe Work Practices".
- Do not disturb lead based paint particularly in homes with small children. Staff and contractors shall assume that any paint on windows and doors contains lead, unless it has been verified otherwise.
- If paint chips/dust results from weatherization work, the area shall be cleaned in accordance with Lead-Safe Work Practices.
- Provide clients and workers with information regarding the dangers of lead poisoning. A Notice of Potentially Unsafe Condition shall be provided if client safety concerns exist.

### 3913 UNSAFE CONDITIONS:

Unsafe conditions determined during the course of weatherization shall be documented and written notice shall be provided to the client, /landlord, /property owner. A copy of the notice shall be maintained in the client/job file, Notice of Unsafe Conditions (DHS-4288) is located in the forms section at the end of this manual.

### 3914 WIRING – HEALTH/SAFETY CONCERNS:

- Electric shock while working around wiring.
- Fire resulting from arcing between loose wiring connections
- Fire resulting from lack of dissipation of heat due to insulation over/around heat producing sources.
- Integrity and safety of knob and tube wiring.

### 3915 TO MINIMIZE RISKS:

- Workers must demonstrate caution when working around wiring.
- Verify proper wiring connections and proper fusing.
- Verify proper blocking out of insulation around heat-producing sources.

### 3916 INSULATING IN AREAS WITH WIRING:

Inspection prior to installing insulation is critical to insure there are no potential hazards relative to the wiring.

- If knob and tube wiring exists in wall cavities to be insulated, it must be in good condition.
- Breakers or "S" type fuses must be installed in the fuse box (fuses appropriate to the wire size).
- OTHERWISE SUCH AREAS SHALL NOT BE INSULATED AND THE FILE PROPERLY DOCUMENTED

Insulating over knob and tube wiring is prohibited in some areas by code.

Any evidence of problems with wiring in the wall cavities to be blown shall be inspected and corrected by a licensed electrician.

## **4000 HEALTH AND SAFETY MEASURES**

Health and safety measures may be completed for the elimination of energy-related health and safety hazards.

### 4001 MANDATORY HEALTH AND SAFETY MEASURES:

- Installation of smoke detectors shall be placed in accordance with all State of Michigan and Local Fire/Building Codes.
- The venting of clothes dryers to the exterior shall be completed (when possible).

### 4002 TESTING:

Testing requirements relative to blower door testing, carbon monoxide testing, combustion appliance inspection/testing, and infrared scans are contained in this section.

### 4003 BLOWER DOOR TESTING:

The blower door shall be used at the pre and post inspection as a diagnostic tool to measure the air tightness of buildings and to help locate air leakage sites.

Based on a pre-weatherization blower door test to determine the air changes per hour (ACH) at 50 pascal (Pa), the following guidelines shall be utilized in air sealing homes utilizing a blower door:

Pre ACH @ 50 Pa Recommended ACH Percentage Reduction

- 0-5 No sealing work (mechanical ventilation may be needed).
- 6-10 Only "Major Bypasses" shall be addressed.
- 11-17 A minimum 25 percent ACH reduction.
- 18-22 A minimum 35 percent ACH reduction.
- 23+ A minimum 40 percent ACH reduction.

Note: In cases where the above recommended ACH percentage reduction cannot be achieved, reasons shall be documented on the eBCJO. The ACH reduction shall not exceed recommended minimum levels of air sealing without documented Combustion Appliance Zone (CAZ) testing. (addressed below)



#### 4004 MINIMUM LEVELS OF AIR SEALING:

Each home shall be evaluated for minimum sealing levels based on current occupants (CFM Persons) and/or potential future occupancy (CFM Bedrooms).

<b>For house pressures of less than 50 Pa, multiply the appropriate CFM from Blower Door Conversion Table times the appropriate Can't Reach Fifty Multiplication Factor in this section</b>			
<b>CAN'T REACH FIFTY MULTIPLICATION FACTOR</b>	<b>House Pressure Achieved</b>	<b>CRF Factor</b>	<b>Note: For house pressures of less than 50 Pa, multiply the appropriate CFM from Blower Door Conversion Table times the appropriate Can't Reach Fifty Multiplication Factor in this section</b>
	15 PA 20 PA 22 PA	1.95 1.81 1.71	
	24 PA 25 PA 26 PA	1.61 1.57 1.53	
	28 PA 30 PA 31 PA	1.46 1.39 1.34	
	34 PA 35 PA 36 PA	1.28 1.26 1.24	
	38 PA 40 PA 42 PA	1.20 1.16 1.12	
	44 PA 45 PA 46 PA	1.09 1.075 1.06	
	48 PA 50 PA	1.03 1.00	

If blower door testing cannot be completed, the reason shall be documented on the eBCJO and the "At-risk" form completed. The At Risk Home Status Worksheet (TWP-699) is located in the forms section at the end of this manual.

#### 4005 CARBON MONOXIDE (CO) TESTING:

All homes weatherized shall be tested for CO levels during pre-inspections and post-inspections. Tests shall include ambient air checks of all combustion appliances and any other questionable areas. Levels exceeding 9 parts per million (ppm) shall be documented on the eBCJO and corrective action recommended. See Health and Safety section 4000.

Carbon monoxide alarms may be installed whenever a local agency must defer work on a dwelling under the following circumstances:

- The dwelling unit contains an unsafe combustion appliance
- A combustion appliance is putting off unsafe levels of CO that can not be immediately remedied
- A combustion appliance has minimal draft and/or spillage and CO is being produced
- The dwelling contains a fireplace or wood burning stove that draws combustion air from inside the dwelling

**No weatherization activities will be conducted until it can be verified that the CO problem has been resolved.**

#### **4006 COMBUSTION APPLIANCE INSPECTION/TESTING – PRE-INSPECTION & POST-INSPECTION REQUIREMENTS:**

All combustion appliances shall be inspected and tested during pre-inspection and post-inspection by a Certified Weatherization Inspector and/or a licensed mechanical contractor. Related sections of the eBCJO shall be completed.

Pre-inspection and Post-Inspection of combustion appliances shall include ambient air testing for carbon monoxide, a complete inspection and testing for gas leaks, carbon monoxide, steady state efficiency of furnace/boiler, draft and smoke (for oil fueled units). There shall be no disassembly of the mechanical components of combustion appliances, unless completed by a licensed mechanical contractor.

The Worst Case Depressurization of the Combustion Appliance Zone procedure for draft testing below shall be followed and documented on the eBCJO.

#### **4007 WORST CASE DEPRESSURIZATION OF THE COMBUSTION APPLIANCE ZONE/DRAFT TESTING:**

Combustion appliances shall be tested under the worst case depressurization of the Combustion Appliance Zone (CAZ). The Worst Case Depressurization of the Combustion Appliance Zone testing shall be followed and documented on the eBCJO.

### **4100 INFRARED SCANS**

Agencies shall be responsible for infrared scans in compliance with the requirements of this Subject. Scans may be completed by LWO staff or an infrared scanning contractor.

Scans shall be completed annually for each contractor/crew with priority given to jobs identified by the weatherization monitor and/or LWO inspector(s) for scanning.

Calculations shall be completed for each job scanned to determine the percent of void area present. Jobs containing void areas in excess of 5 percent will require corrective action. Additional scanning of the same contractor/crew shall be completed if repetitive problems are found.

#### **4101 DOCUMENTATION REQUIREMENTS:**

The Infrared Scan Report form (DHS-4286[Rev. 4/06]) (located in the forms section at the end of this manual) shall be completed for each job scanned with a copy maintained in the client/job file and a copy placed in a master file of all infrared scans completed for the PY.

## 4200 PROGRAM REQUIREMENTS – INTRODUCTION

This chapter contains the work related weatherization programmatic policies, procedures, and requirements for the Michigan Weatherization Program, including blower door test requirements, client/job file documentation requirements, standards for weatherization materials, and training and certification requirements. Additional requirements are contained in the Community Services Policy Manual.

### 4201 BLOWER DOOR TEST REQUIREMENTS:

Blower door test requirements are contained in this section.

### 4202 HOMES TO BE TESTED:

All homes weatherized require blower door testing (one-point test) during pre-inspection and post-inspection by a DHS Certified Inspector. Results of blower door testing shall be documented on the eBCJO and maintained in the client/job file.

Conditions which prevent completion of blower door testing shall be documented on the electronic Building Check and Job Order Sheet and the home shall be calculated for "at-risk" status.

### 4203 AT-RISK HOMES/INDOOR AIR QUALITY:

As a guideline in determining homes which may be subject to moisture/indoor air quality problems, the following definition of "at-risk" homes is established:

Any home where the house volume is less than 8400 cubic feet shall be considered "at risk." For homes with more than four occupants, an additional 2100 cubic feet shall be added for each person over four.

Other specific sources of additional moisture/indoor air quality problems in a home which are not being corrected, such as standing water, a high water table, smokers, numerous house plants, etc., shall be treated as additional occupants (e.g., add one or two to the actual number of occupants in the home when calculating "at-risk" status).

### 4204 REQUIRED CALCULATION FOR AT-RISK STATUS:

Homes which cannot be blower door tested (reason documented on eBCJO) shall be calculated for "at risk" status on the last page of the electronic Building Check and Job Order Sheet or on the At-Risk Home Status Worksheet contained in this Subject. Determine the total volume of the heated portions of the house (length X width X height). The actual volume shall be compared to the minimum volume calculated, to determine if the house is "at-risk." Homes determined to be "at-risk" shall not be air sealed (except for addressing Major Bypasses section 3100) and additional follow-up may be required (e.g., Notice of Indoor Air Quality Concern, health and safety measures, client education, etc.).

Example: To determine whether a home is "at-risk," the following calculations would be completed:

- A. Determine total volume of heated space - A manufactured home is measured and has a length of 70 feet, width of 16 feet, and ceiling height of 8 feet. The volume of heated space is calculated by multiplying 70 feet (length) X 16 feet (width) X 8 feet (height) = 8960 cubic feet.
- B. Determine the cubic feet minimum relative to "at-risk" status - There are five persons living in the home and there is a moisture problem due to a large aquarium. 8400 cubic feet minimum + 2100 cubic feet (2100 for each person over four,  $5 - 4 = 1$ ,  $1 \times 2100 = 2100$  cubic feet addition relative to the number of persons in the household) + 2100 cubic feet (relative to the aquarium) = 12,600 cubic feet minimum.
- C. Determine if the actual cubic footage of heated space is below the minimum cubic footage

requirement relative to "at-risk" status-Since the manufactured home volume is less than the minimum cubic footage calculated for "at-risk" status, the home is considered "at-risk" and shall not be further sealed, except for Major Bypasses. Conditions shall be reviewed to determine if problems require further action (e.g., fresh air venting, client education to address moisture problems, etc.).

#### 4205 AT-RISK HOME STATUS WORKSHEET/DOCUMENTATION REQUIREMENTS:

A worksheet may be utilized to calculate "At-Risk" home status.

If this procedure is utilized (in lieu of completing calculations on the page 3 of the eBCJO), a copy of the worksheet shall be maintained in the client/job file.

#### 4300 CLIENT FILE REQUIREMENTS/DOCUMENTATION

Client/job file requirements/documentation relative to the job site and completed units are contained in this section. Also contained in this section/subject is a definition of requirements for a unit to be considered as a weatherization completion ("Unit Completion Reference").

#### 4301 JOB SITE REQUIREMENTS:

Job site documentation requirements:

1. Electronic Building Check and Job Order Sheet
2. Client Plan of Action
3. Client Inspection/Assessment

#### 4302 ELECTRONIC BUILDING CHECK and JOB ORDER SHEET (eBCJO) COMPLETION REQUIREMENTS:

Each unit weatherized shall have weatherization work documented on the eBCJO. This form shall be completed during the course of the weatherization work including:

- Client information.
- Pre-inspection data including estimated materials/costs.
- Testing results (blower door, combustion appliances, etc.).
- Actual materials/labor costs.
- Sign-offs.

Any drawings, spread sheets, NEAT data sheets, or other information utilized in conjunction with completion of the eBCJO and the NEAT audit shall be referenced on the appropriate page of the eBCJO and included in the client/job file.

The eBCJO must be completely filled out including all cost information and sign-offs, and shall be filed in the client/job file along with all related information (e.g., application, Client Inspection and Assessment form, invoices, Certificate of Insulation, health and safety notifications, Client Plan of Action) pertaining to the job, before the job, is reported as a completion.

#### 4303 eBCJO/MULTI FAMILY BUILDINGS:

An eBCJO shall be completed for buildings/units weatherized. The eBCJO shall be fully completed including all general information, measures/materials, costs, and sign-offs.

The files shall clearly indicate what work was done to the entire building--documented by using one comprehensive eBCJO or an eBCJO for each unit. In addition, weatherization work performed in common areas (e.g., hallways, attics, basements, etc.) shall be documented on the eBCJO.

All client files for the building must be clearly cross-referenced so that any reviewer can easily determine building eligibility under the 66 percent (50 percent) rule, or any other aspect of the total weatherization work to that multifamily building. The file(s) must clearly indicate it is a multifamily building.

#### 4304 COSTS:

The following requirements apply relative to recording of job related costs:

- Identify charges according to funding source.
- All weatherization related costs must be itemized on the eBCJO

#### 4305 eBCJO FORMS:

There are two versions of the eBCJO contained in the following pages of this Subject:

- 4284M Is to be used for manufactured homes using MHEA or Manufactured Priority Measures.
- 4284N Is to be used for homes to be evaluated using NEAT or NEAT Measures Priority.

See CSPM 612.1.

#### 4306 CLIENT PLAN OF ACTION:

Client energy education shall be provided throughout the weatherization process (see CSPM 612.4, Client Energy Education). A Client Plan of Action shall be maintained in the client/job file and three Energy Action Steps discussed/reinforced during subsequent visits. If the client is not agreeable to completing a Client Plan of Action, this shall be documented in the client/job file.

#### 4307 CLIENT INSPECTION/ASSESSMENT:

As part of the post-inspection a Client Inspection/Assessment for Weatherization (see the forms section located at the end of this manual) shall be completed and signed by the post-inspector and client. The client is asked to complete an assessment of each of the Wx measures. The completed/signed form shall be maintained in the client/job file. If the client refuses to sign or for some other reason the form cannot be completed, the reason shall be documented in the client/job file.

#### 4308 UNIT COMPLETION REFERENCE:

A dwelling unit shall not be reported as completed until all weatherization materials have been installed and the LWO, or its authorized representative, has performed and approved a post inspection.

In cases in which weatherization work was started but cannot be completed for a justified reason, signed and dated documentation shall be provided in the client job file as to why the weatherization work was stopped and the unit may be considered a completion. Examples of reasons to stop weatherization work:

- Death of client.
- Dwelling is vacated and/or sold.
- Unable to contact client after numerous (documented) attempts.
- Extensive fire damage.
- Client refuses further weatherization work.
- Health and safety risks to contractor/crew (e.g. unsanitary conditions, drugs, threats, etc.).

#### 4309 NEAT FILE DOCUMENTATION:

The client/job files for units weatherized using NEAT audits shall include and have available the Input & Output Summary Reports.

#### 4310 MANUAL J FILE DOCUMENTATION:

The client/job files where furnace replacement occurs using manual "J" shall include and have available the complete sizing reports (only the DOE listed and accepted Manual "J" shall be used).

#### 4311 FILE DOCUMENTATION CHECKLIST:

All required forms and documentation shall be maintained in the client/job file. Prior to reporting weatherization units as completions, LWO shall verify that all required/appropriate forms and documentation are included in the client/job file.

The Checklist is an optional form which may be used as an aid to insure the completeness of client/job files (see form DHS-4291 in the forms section at the end of this manual).

### **4400 STANDARDS FOR WEATHERIZATION MATERIALS**

#### 4401 MATERIALS STANDARDS:

Weatherization materials standards and insulation requirements are contained in this Section/Subject.

#### 4402 MINIMUM STANDARDS FOR WEATHERIZATION MATERIALS:

The attached Department of Energy Weatherization Assistance Program (DOE/ WAP) For Low-Income Persons, 10 CFR Part 440 Final Rule dated February 1, 2002, Appendix A-Standards for Weatherization Materials from paragraph 440.21 - Weatherization Materials Standards and Energy Audit Procedures, lists all allowable weatherization materials and contains the minimum standards and testing requirements for weatherization materials.

In cases where Michigan Weatherization Program standards are more restrictive, such requirements will be enforced. For example:

In addition to Appendix A requirements, the Michigan Weatherization Program ten-year life requirement for weatherization materials will be enforced. Materials listed in Appendix A which are not included in the allowable NEAT Candidate Conservation Measures are not allowable unless specifically authorized by the State of Michigan Weatherization Technical Division.

#### 4403 INSULATION REQUIREMENTS - CERTIFICATE OF INSULATION:

Whenever an area is addressed/completed with thermal insulation (attic, wall, perimeter, or floor insulation), contractors/crews are required to complete in triplicate a Certificate of Insulation form (see sample in forms section). This form shall contain the following information:

- Address of the building insulated
- Date of completion of the installation
- Name and address of the installer
- Insulation type (e.g. cellulose, fiberglass, rigid foam)
- Insulation manufacturer
- When cellulose insulation is used, data from the bag specifying plant, batch number, date, and/or any other information needed to identify the batch
- Location and dimension (in square feet) of each space which is insulated

- The amount of insulation which was installed in each of the locations, given in the units in which the material is most commonly available (e.g. bags, rolls, sheets)
- The R-value installed in each of the identified locations; and
- A statement signed by an authorized individual, certifying that the installation was carried out in conformance to the applicable standard practices, codes, and regulations.

One copy of this form goes to the client/homeowner another is permanently affixed to the house in an accessible, but inconspicuous, place (e.g., in the attic above the attic access, by the water heater or electric service panel); and the third copy goes to the agency client/job file. Whenever cellulose insulation is utilized, an empty cellulose bag shall be posted at the house with the Certificate of Insulation. If more than one type of cellulose is used, an empty bag for each type used shall be posted.

#### **4404 CELLULOSE TESTING/LABELING REQUIREMENTS:**

In addition to the manufacturer's testing of cellulose insulation, it is required that all cellulose insulation used in the weatherization program be approved by an independent third-party testing lab and bear a test lab label.

Each bag of insulation purchased for use in the weatherization program must be labeled with the "full" label of the third-party test lab stating that the product is in conformance with the current standard for cellulose from this section., Minimum Standards for Wx Materials, in this section and listing the test results for:

- Critical Radiant Flux
- Smoldering Combustion
- Corrosiveness
- Fungi Resistance
- Settled Density
- Thermal Resistance
- Moisture Absorption
- Odor Emission
- Starch Content

In addition, each bag must bear a legible batch number permanently marked by the manufacturer (hand written identification numbers are not acceptable) and ASTM number stating compliance with the current standard for cellulose from this section., Minimum Standards for Wx Materials. Costs may be disallowed in cases where these requirements are not met.

Each local agency must obtain and maintain an up-to-date copy of the contract between the testing lab and the manufacturer and a current (within the last 12 months) third party test lab inspection report for each brand being utilized. Only those labs whose contracts call for a minimum of four on-site, no-notice tests per year will be acceptable.

The above-listed conditions must be satisfactorily met prior to the purchase and use of cellulose insulation.

#### **4405 WET-SPRAY CELLULOSE INSULATION:**

The application of wet-spray cellulose insulation is allowable. The application must comply with ASTM C1149-90 and the manufacturer's instructions on the mixture and application of this product.

**4406 CELLULOSE MANUFACTURERS/BRANDS WITH APPROVED THIRD-PARTY TESTING:**

The following manufacturers/brands have been reviewed by the State of Michigan Weatherization Technical Division for compliance with the above cellulose insulation third-party testing requirements and were found to be in conformance:

<b>Manufacturer</b>	<b>Brands</b>
Applegate Insulation Mfg., Inc. 1000 Highview Drive Webberville, MI 48892	Applegate Stabilized Cellulose
Champion Insulation Inc. P.O. Box 310 Lomira, Wisconsin 53048	Weather Blanket House Blanket Comfort Control Wickes
Energy Control, Inc. 804 West Mill Street Ossian, Indiana 46777	ECI-II Forest Wool Double Pack Climate Control Wickes Lumber Momper Insulation Forest Wool
Greenstone a Louisiana-Pacific Corp. P.O.Box 1533 East Highway 24 Norfolk, NE 68702	Nature Guard Cocoon Insulation Do-It Do-It Best Earth Wise Greenstone R-Pro R-Pro Plus Goodnews
Modern Insulation Inc. P.O. Box 157 Spencer, Wisconsin 54479	Weather Blanket
NuWool Company Inc. 2472 Port Sheldon Street Jenison, Michigan 48428	Energy Care NuWool Insulation ERB Lumber ATI
Regal Industries, Inc. 9564 East County Road, 600 South Crothersville, Indiana 47229	Professional Professional Brand IV Do-It Best Coverage Buster Gold Coverage Buster Blue Max Pack
US Fiber, Inc	Total Comfort Insulation Plus ProPack

Note: Agencies will not be required to obtain testing documentation relative to the above-listed manufacturers/brands. It shall be noted that some manufacturers produce both test lab labeled and unlabeled products; brands not listed above will require complete documentation (as stated above).



## 4407 WEATHERIZATION MATERIALS DOCUMENTATION REQUIREMENTS:

Agencies shall be responsible for compliance of all products used in weatherization with the required standards contained in the Weatherization Field Manual (including DOE/WAP Appendix A Standards for Weatherization Materials contained in this section).

Documentation shall be maintained at the agency which establishes compliance with standards and testing requirements. Types of documentation may include manufacturer's specifications, material containers, and/or test lab reports. In cases where contractors are providing materials, the agency shall maintain documentation on all products being used by each contractor. Product documentation shall be organized in one location and available for monitoring review.

## 4500 TRAINING/CERTIFICATION REQUIREMENTS

Training/certification requirements relative to blower door, pre-inspector/post-inspector, infrared wall scanner, Indoor Air Quality/Mold, and Lead-Safe Work (LSW) practices are contained in this section

### 4501 BLOWER DOOR TRAINING:

Each LWO shall have at least one DHS Certified Inspector available who is trained and capable of properly completing blower door testing and related calculations.

### 4502 WEATHERIZATION INSPECTOR TRAINING/CERTIFICATION:

Weatherization inspector training/testing will be offered by the State Of Michigan. New inspectors shall attend and pass these training sessions prior to performing any Weatherization inspections. Those who qualify for certification by passing the required testing and satisfactorily completing on-the-job training subsequent to the testing will be issued a certificate. Documentation relative to inspector certification shall be maintained at the agency.

The State of Michigan Weatherization Technical Division may offer special testing relative to inspector certification as deemed appropriate. The State of Michigan Weatherization Technical Division also reserves the right to withdraw inspector certification at any time.

Each LWO must have at least one person certified to complete weatherization inspections. New inspectors and/or conditionally certified inspectors must complete inspections under the supervision and/or review of a certified inspector.

The State of Michigan Weatherization Technical Division may establish additional training/testing requirements as needed.

### 4503 INFRARED SCANNER TRAINING:

Infrared Scanner orientation training will be offered on an as needed basis. Those attending this training will be authorized to use the State of Michigan Weatherization Technical Division infrared cameras. Individuals who have not attended one of these trainings will not be permitted to utilize this equipment.

### 4504 LEAD SAFE WORK PRACTICES TRAINING:

Lead Safe Work practices orientation training will be offered on an as needed basis, new staff are required to attend training within 120 days of the date they are hired. Those who attend and pass this training will be authorized to inspect, supervise, and/or work on the homes as specified in Michigan's Weatherization Program. Individuals who have not attended one of these training sessions will not be permitted to inspect, supervise, and/or work on the homes to be weatherized unless they are

accompanied by or in the presence of staff who have attended the required training. The "Lead Abatement Certification" for contractors, foremen, and crew personnel is acceptable in lieu of the Lead Safe Work practices training.

Mechanical, plumbing, roofing, and electrical contractors and their personnel who work on a dwelling as part of the DOE weatherization process are also required to obtain the necessary Lead Safe Work Practices training.

Michigan's LIHEAP and MPSC programs follow DOE rules.

5000 FORMS
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Weatherization Agency Name:		
Address (Street Number and Name):		
City:	State: Michigan	Zip Code:
Telephone Number: (       )		

Client Name:		Address of Home (Street Number and Name):	
City:	State: Michigan	Zip Code:	Job Number:

[illegible]

Person(s) Notified (Client, Landlord, Owner, Third Party):

Weatherization workers are not qualified or allowed to work on any asbestos containing products which could create asbestos dust.

Further information on asbestos is available from the U.S. Consumer Product Safety Commission. They may be contacted by calling (800) 638-2772 or writing U.S. Consumer Product Safety Commission, Washington, D.C. 20207. Also, the U.S. Environmental Protection Agency has an "Asbestos Hotline" at (800) 368-5888. State regulations are administered by the Michigan Department of Consumer and Industry Services, Division of Occupational Health, Asbestos Program, 7150 Harris Drive, Lansing, Michigan 48909. Phone: (517) 322-1320.

A copy of this notice was sent to all parties of interest listed above (a copy shall be retained in the client file)		Signature of Agency Representative: _____ Date: _____	
AUTHORITY COMPLETION: PENALTY:	P.A. 230 OF 1981: Required None	The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, martial status, political beliefs or disability.	

**WEATHERIZATION PROGRAM  
NOTICE OF INDOOR  
AIR QUALITY CONCERN  
State of Michigan  
Department of Human Services**

Weatherization Agency Name:

Address (Street Number and Name):

City:

State:

Michigan

Zip Code:

Telephone Number:

(       )

Client Name:

Address of Home (Street Number and Name):

City:

State:

Michigan

Zip Code:

Job Number:

Indoor Air Quality Concern:

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Person(s) Notified (Client, Landlord, Owner, Third Party):

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Recommendations:

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Further information relative to Indoor Air Quality concerns is available from the U.S. Consumer Product Safety Commission: Call (800) 638-2772 or write U.S. Consumer Product Safety Commission, Washington D.C. 20207.

A copy of this notice was sent to all parties of interest listed above (a copy shall be retained in the client file)

Signature of Agency Representative:

Date:

AUTHORITY    P.A. 230 OF 1981:  
COMPLETION:    Required  
PENALTY:        None

The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, martial status, political beliefs or disability.

**WEATHERIZATION PROGRAM  
NOTICE OF POTENTIALLY  
UNSAFE CONDITION  
State of Michigan  
Department of Human Services**

Weatherization Agency Name:

Address (Street Number and Name):

City:

State:

Michigan

Zip Code:

Telephone Number:

(       )

Client Name:

Address of Home (Street Number and Name):

City:

State:

Michigan

Zip Code:

Job Number:

Unsafe Contrition:

Person(s) Notified (Client, Landlord, Owner, Third Party):

Recommendations:

Questions concerning "Lead" may be directed to the Environmental Protection Agency - LEAD HOTLINE: (800) 424-5323.

A copy of this notice was sent to all parties of interest listed above (a copy shall be retained in the client file)

Signature of Agency Representative:

Date:

AUTHORITY    P.A. 230 OF 1981:  
COMPLETION:    Required  
PENALTY:        None

The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, martial status, political beliefs or disability.

# INFRARED SCAN REPORT WEATHERIZATION PROGRAM

State of Michigan  
Department of Human Services

Weatherization Agency Name

Job Number

Client Name

Address (Street Number and Name)

Contractor

City

State

Zip Code

Scan By

Date

Telephone Number

( )

## INTERIOR WALL ELEVATIONS (MAIN FLOOR)

## INTERIOR WALL ELEVATIONS (2ND FLOOR)

A.	H.	1.	4.
B.	I.	2.	5.
C.	J.	3.	6.
D.	K.	Draw Views of Structure (Main Floor Plan)	
E.	L.		
F.	M.	Draw Views of Structure (2nd Floor Plan)	
G.	N.		

### Symbols

BR -- Bedroom      LR -- Living Room  
DR -- Dining Room      K -- Kitchen  
B -- Bath      C -- Closet  
KC -- Kitchen Cabinets      FP -- Fireplace  
KW -- Knee wall      III -- Studs  
LD -- Low Density      H -- Header  
P -- Partition      W -- Window  
? -- Scan Unclear      D -- Door  
RA -- Return Air / Duct  
SL -- Sloped Ceiling  
ST -- Stairs  
V -- Void

### Comments

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(Void Area \_\_\_\_\_ SF) ÷ (Total Wall Area \_\_\_\_\_ SF) = \_\_\_\_\_ % Void

Authority: PA 230 of 1981  
Completion: Required  
Penalty: None

The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, marital status, political beliefs or disability.

DHS-4286 (Rev. 4/06) Previous editions obsolete

<b>WEATHERIZATION CHECKLIST FOR CLIENT/JOB FILE DOCUMENTATION</b>  State of Michigan Department of Human Services	Weatherization Agency Name		
	Client Name		
	Address (Street Number and Name)		
Job Number _____	City	State	Rep. Initials

### I. CLIENT ELIGIBILITY (see C SPM for policies/forms)

<b>Yes/NA</b>	
<input type="checkbox"/> / <input type="checkbox"/>	1. Client Application DHS -4283 (Rev. 4/99)
<input type="checkbox"/> / <input type="checkbox"/>	2. Proof of Income
<input type="checkbox"/> / <input type="checkbox"/>	3. Ownership or Landlord Agreement/Exhibits/Tenant Synopsis/ and Lease
<input type="checkbox"/> / <input type="checkbox"/>	4. Priority Criteria Selection
<input type="checkbox"/> / <input type="checkbox"/>	5. Notification of Eligibility/Ineligibility
	a. Notification of Job Scheduling
	b. Notification of Appeal Process

### II. JOB-RELATED (see WFM for policies/forms)

<b>Yes/NA</b>	
<input type="checkbox"/> / <input type="checkbox"/>	1. Electronic Building Check and Job Order Sheet (eBCJO) DHS-4284M-406.1 or DHS-4284N-406.1 (Rev. 3/06)
<input type="checkbox"/> / <input type="checkbox"/>	2. Blower Door Test Data Sheet DHS -4287 (Rev. 11/02), eBCJO – DHS -4284M-406.1, or DHS -4284N-406.1 (Rev.3/06), or a completed "AT Risk Home Status Work Sheet"
<input type="checkbox"/> / <input type="checkbox"/>	3. NEAT Job Input Summary Report/NEAT Output Summary Report (Recommended Measures List)
<input type="checkbox"/> / <input type="checkbox"/>	4. Confirmation of Receipt of Lead Pamphlet FIA-4285
<input type="checkbox"/> / <input type="checkbox"/>	5. Client Energy Plan of Action
<input type="checkbox"/> / <input type="checkbox"/>	6. Asbestos Notification Letter DHS -4290 (Rev. 4/06)
<input type="checkbox"/> / <input type="checkbox"/>	7. Notice of Indoor Air Quality Concern DHS -4289 (Rev. 4/06)
<input type="checkbox"/> / <input type="checkbox"/>	8. Notice of Potentially Unsafe Condition DHS -4288 (Rev. 4/06)
<input type="checkbox"/> / <input type="checkbox"/>	9. Certificate of Insulation
<input type="checkbox"/> / <input type="checkbox"/>	10. Contractor's Invoice
<input type="checkbox"/> / <input type="checkbox"/>	11. Post-inspection Documentation/Corrections Approved
<input type="checkbox"/> / <input type="checkbox"/>	12. Client Inspection/Assessment DHS -1008 (Rev. 4/06)
<input type="checkbox"/> / <input type="checkbox"/>	13. Refrigerator Documentation
<input type="checkbox"/> / <input type="checkbox"/>	15. Water Heater Documentation
<input type="checkbox"/> / <input type="checkbox"/>	16. Permit(s) for Furnace or Water Heater Replacement
<input type="checkbox"/> / <input type="checkbox"/>	17. Other _____
<input type="checkbox"/> / <input type="checkbox"/>	18. _____
<input type="checkbox"/> / <input type="checkbox"/>	19. _____

Authority: PA 230 of 1981 Completion: Optional Penalty: None	The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, marital status, Political beliefs or disability.
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DHS-4291 (Rev.4/06) previous editions obsolete

<b>WEATHERIZATION PROGRAM</b> <b>CLIENT</b> <b>INSPECTION/ASSESSMENT</b> <b>State of Michigan</b> <b>Department of Human Services</b>	Weatherization Agency Name:		
	Address (Street Number and Name):		
	City:	State: Michigan	Zip Code:
	Telephone Number: (       )		

Client Name:		Address of Home (Street Number and Name):	
City:	State: Michigan	Zip Code:	Job Number:

The services performed on your home were completed to the extent possible within the current available funding and program limitations. The services provided are free of charge. Please rate the performance of each task which was completed. Thank you for your cooperation.

WEATHERIZATION MEASURE Check Work Performed		CLIENT ASSESSMENT Good      Fair      Poor			WEATHERIZATION MEASURE Check Work Performed		CLIENT ASSESSMENT Good      Fair      Poor		
<input type="checkbox"/>	Health and Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Band Joist Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Major Bypasses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floor Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Duct Sealing/Repair/Replacement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Perimeter Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Duct Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Refrigerator Replacement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Furnace Filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water Heater Replacement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Attic Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Furnace Replacement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Knee wall Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Wall Insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Infiltration/Exfiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Compact Fluorescent Light Bulbs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*Please note that not all the above measures are installed on every home. The local weatherization agency makes final installation decisions after their pre-inspection and after reviewing total job costs and program limitations.

I understand that representatives of the state and federal government have the responsibility to monitor the performance of the weatherization agency. This means that the work performed to my dwelling may be inspected by representatives of those organizations.

By signature, I certify that the weatherization tasks were completed in my home and I have rated the weatherization crew's work performance.

Client's Signature:	Date:
Inspector's Signature:	Date:

Additional Comments:
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AUTHORITY      P.A. 230 OF 1981: COMPLETION:      Required PENALTY:              None	The Department of Human Services will not discriminate against any individual or group because of race, sex, religion, age, national origin, color, marital status, political beliefs or disability.
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LWO  
address  
City, State, Zip  
telephone

## CERTIFICATE OF INSULATION

Job Number: \_\_\_\_\_

Address of building insulated:

Client \_\_\_\_\_  
Street \_\_\_\_\_  
City/State/Zip Code \_\_\_\_\_

Date of completion of installation:

Name and Address of installer:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Insulation Type: \_\_\_\_\_

Insulation Manufacturer: \_\_\_\_\_  
\_\_\_\_\_

If Cellulose, Batch Number:

\*A bag must be attached with a copy to the CERTIFICATE OF INSULATION in an accessible area indicating the Manufacturer printed batch number - ***the number can not be hand written***.

Location and Dimension (in square feet) of space(s) insulated:

<u>Location</u>	<u>Amount (sq. ft./linear ft)</u>	<u>Inches</u>	<u>(bags)</u>	<u>(rolls)</u>	<u>R-Value</u>
Sidewall	_____	_____	_____	_____	_____
Floor/Perimeter	_____	_____	_____	_____	_____
Sill box (band joist)	_____	_____	_____	_____	_____
Attic (open)	_____	_____	_____	_____	_____
Attic, collar	_____	_____	_____	_____	_____
Attic, OCJ	_____	_____	_____	_____	_____
Attic, knee wall	_____	_____	_____	_____	_____
Attic, rafter (slope)	_____	_____	_____	_____	_____

I certify that the installation of the above mentioned insulation was performed in conformance with standard practices, codes, and regulations and the applied insulation meets specifications as indicated in the Weatherization Field Manual.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Client: \_\_\_\_\_

Job Number: \_\_\_\_\_

### **At-Risk Home Status Worksheet**

WFM Chapter III, Section I, Subject B contains requirements relative to determining At-Risk Home Status

(A) Actual Volume

Volume of Heated Area:

First Floor	Length		X Width		=		sq ft X Height		A =		Cubic ft
Second Floor	Length		X Width		=		sq ft X Height		B =		Cubic ft
Other	Length		X Width		=		sq ft X Height		C =		Cubic ft
Other	Length		X Width		=		sq ft X Height		D =		Cubic ft
Other	Length		X Width		=		sq ft X Height		E =		Cubic ft
Other	Length		X Width		=		sq ft X Height		F =		Cubic ft
Cond. Bsmt.	Length		X Width		=		sq ft X Height		H =		Cubic ft
Conditioned Area is A+B+C+D+E+F+G+H						Total	=	sq ft	Total House Vol =		Cubic ft

**A. Total House Volume:**

**Cubic Feet**

B. Minimum Volume

Minimum Volume (up to 4 occupants) =

A) 8400 Cubic Feet

+ \_\_\_\_\_ # of occupants over 4 X 2100 cubic feet =

B) \_\_\_\_\_ Cubic Feet

+ \_\_\_\_\_ # of IAQ problems X 2100 cubic feet =

C) \_\_\_\_\_ Cubic Feet

**B. Total Minimum Volume (A + B + C):** 8400 Cubic Feet

C. At-Risk Status

☐

**Not At-Risk** - If "A" is greater than "B", then seal house according to normal Weatherization procedures

☐

**At-Risk** - If "B" is greater than "A", then the home is considered "At-Risk" and should not be further sealed, except for addressing "Major Bypasses" (WFM II.I.B) and agency follow-up (i.e., Notice of Indoor Air Quality Concern, Health & Safety measures).

\*Add additional Cubic Feet for indoor air quality (IAQ) issues which will not be corrected, such as standing water, at row 25 column N on page 3 of the eBCJO.

**Note: The eBCJO should be documented relative to the reason why a blower door test could not be performed.**

4/1/06